QUEENSLAND HERBARIUM
DEPARTMENT OF PRIMARY INDUSTRIES
BRISBANE

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Printed for the Queensland Herbarium,
Meiers Road, Indooroopilly, Brisbane,
Queensland 4068 Australia

by

S. G. Reid, Government Printer,
Brisbane 1972

Contributions from the Queensland Herbarium No. 13.

NEURACHNE AND ITS ALLIES (GRAMINEAE)

By S. T. BLAKE

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SUMMARY

The genus *Neurachne* comprises *N. alopecuroidea* R. Br., *N. munroi* (F. Muell.) F. Muell., *N. lanigera* sp. nov., *N. minor* sp. nov., *N. qeenslandica* sp. nov. and *N. tenuifolia* sp. nov. Two new genera, *Paraneurachne* S. T. Blake and *Thyridolepis* S. T. Blake, are described for other species with the new combinations *Paraneurachne muelleri* (Hack.) S. T. Blake (*N. muelleri* Hack., *N. clementii* Domin), *Thyridolepis mitchelliana* (Nees) S. T. Blake, *T. multiculmis* (Pilger) S. T. Blake and *T. xerophila* (Domin) S. T. Blake. These genera constitute a new tribe Neurachneae of the Panicoideae sens. lat. All species are restricted to Australia.

INTRODUCTION

This paper is based on work done intermittently over many years during which specimens in the following herbaria were examined in addition to those in the Queensland Herbarium, Brisbane (BRI): State Herbarium of South Australia, Adelaide (AD); British Museum (Natural History), London (BM); Herbarium Australiense, Canberra (CANB); Lindley Herbarium, Cambridge University, England (CGE); Royal Botanic Gardens Kew, England, (K); National Herbarium of Victoria, Melbourne (MEL); National Herbarium of New South Wales, Sydney (NSW); Herbarium of Northern Territory, Alice Springs (NT); Western Australian Herbarium, Perth (PERTH); National Museum of Czecho-Slovakia, Prague (PR); Naturhistorisches Museum, Vienna (W). I am grateful to the Directors and other members of the staffs of these institutions for the opportunity to study this material. I am also grateful to Dr. Eva Potztal and to Dr. K. Rostanski for searching for types in the Berlin Herbarium (Botanischer Garten und Botanisches Museum Berlin-Dahlem (B)) and Wroclaw Herbarium (Herbarium Instituti botanici Unversitatis Wratislaviensis (WRSL)) respectively. Dr. H. T. Clifford, Botany Department, University of Queensland, examined the epidermal structures and I am grateful to him for the use of unpublished drawings of these features.

Bibliographical references to each name have usually been restricted to works in which descriptions, figures, or critical observations are to be found and which are referred to in the discussions.

Plane shapes are described according to the scheme proposed by the Systematics Association Committee for descriptive Biological Terminology in Taxon 11: SADT Chart 1a (1962).

NEURACHNE AND ITS ALLIES

The genus *Neurachne* R. Br. Prodr. 196 (1810) was founded on a single species *N. alopecuroidea* R. Br. loc. cit. and described from specimens collected at King George Sound by Menzies in Sept.–Oct. 1791 and by Brown himself in Dec. 1801. It was placed nearest to *Cenchrus* and *Isachne* and distinguished especially by the following combination of characters: Spikelets 2-flowered with the lower flower neuter in a simple spike without any involucre, subequal strongly-nerved glumes indurated at maturity, lower lemma like the glumes, and a hyaline membranous upper lemma and palea. In Sturt, Exped. Centr. Austr. 2, App. 89 (1849) he described a second species *N. paradoxa* from a small specimen collected by Sturt near the meeting of the boundaries of South Australia, New South Wales and Queensland, but this was transferred first to *Panicum* as *P. pseudoneurachne* F. Muell. then to *Spinifex* as *S. paradoxus* (R. Br.) Benth. and later bacame the type of *Zygochloa* S. T. Blake, Univ. Qd Pap. Dept. Biol. 1 (19): 7 (1941).

Nees in Hook. Lond. J. Bot. 2: 410 (1843) added *N. mitchelliana* Nees and published a diagnosis of *N. phleoides* R. Br. (p. 411) but the latter appears to be a slip of the pen for *N. alopecuroidea*; F. Mueller transferred *Panicum munroi* F. Muell. to *Neurachne* in 1864. Other species were described by Hackel (1895), Pilger (1904) and Domin (1912, 1913). A few extra-Australian species have been referred to this genus, but of these *N. meneritana* (Poir.) R. & S. from Mauritius is *Isachne mauritiana* Kunth although the specimens referred to it by Bojer Hort. Maurit. 366 (1837) belong to *Sporobolus tenuissimus* (Schrank) O. Ktze (Hubbard & Vaughan, Grasses of Mauritius and Rodriguez 60, 54 (1940)), while *N. montana* Gaud. and *N. torrida* Gaud. ex Kunth pro syn., both from Hawaii were both referred by Kunth to *Panicum*, an opinion shared by later authors. *N. peekelii* Lauterb. from New Ireland is *Sacciolepis indica* (L.) Chase according to Pilger, Bot. Jahrb. 52:171 (1914) ("*Panicum indicum* L."). The type could not be found at Berlin or in the Lauterbach herbarium (WRSL).

N. alopecuroidea was transferred to *Panicum* by Sprengel, Syst. Veg. 1: 309 (1825), but all later authors have agreed that it represents a distinct genus. All the Australian species excluding *N. paradoxa* have the following characters in common: Spikelets very shortly pedicellate around the axis of a simple terminal raceme, falling entire with a basal beard, dorsally compressed, 2-flowered with the lower flower male or neuter and the upper hermaphrodite and the rhachilla not produced beyond it; glumes subequal, at least the upper equalling or more usually longer to much longer than the florets, ± acuminate, at least 5-nerved, ± prominently 2-keeled; lemma of lower floret embracing the upper floret at least in the lower part, much narrowed upwards, 5–7-nerved; lemma of upper floret with flat thin margins; palea resembling the lemma in texture; lodicules, if well developed, ± cuneate; styles long and slender; embryo about $\frac{1}{2}$–$\frac{3}{4}$ the length of the grain; hilum basal, ± punctiform; ligule a zone of dense hairs; midrib of leaf hardly more prominent than other veins.

There are however, differences between species that are as impressive as the resemblances but most authors have ignored them in their descriptions of the genus and treated them as of little importance if mentioned at all in descriptions of species. *N. alopecuroidea*, *N. munroi* and four new species described below have much flattened, ± acute fertile florets with membranous to thinly membranous and hyaline lemmas and paleas (the former is flat and does not embrace the palea in *N. munroi*); the lemma of the lower floret is ± gibbous in the lower part; the glumes are inserted very close together, very conspicuously closely nerved throughout and not much hardened before maturity, slightly diverging upwards; the lodicules are thin; a third style is usually present, sometimes with a well developed stigma but more often rudimentary and appearing as a keeled appendage to the ovary and forming with the widened bases of the others an appendage to the grain; several of the lowermost spikelets are reduced and ± persistent on the axis at least in most specimens; the culms are few-noded, erect and not stoloniform; and the leaf-blades are very little narrowed at the base. On the other hand, *N. mitchelliana*, *N. xerophila* and *N. multiculmis* have a rostrate (or ± abruptly long acuminate), ± turgid fertile floret with an indurated smooth lemma and palea closely embraced by the lemma of the lower floret which is not gibbous; the glumes are ± appressed or incurved, prominently nerved only in the upper part while the lower part is much hardened even before anthesis and prominently tuberculate with bristles from the tubercles; the lower glume has a vertical depressed hyaline area in the lower half above which is a bristle-bearing transverse ridge, and the margins are united at and near the base around the elongated internode of the rhachilla or to the back of the rhachilla itself; the lodicules are thin; there are usually 2 distinct styles and no appendage on the grain; a very few of the lowermost spikelets are ± reduced in size but not in sex; the culms are few- to several-noded, a few of them sometimes overarching and rotting at 1–2 lower nodes; the leaf-blades are much constricted above the sheath, often to a short petiole-like base. *N. muelleri* has a less rostrate but still acuminate turgid fertile floret with indurated ± rugulose lemma and palea; the lemma of the lower floret is gibbous and much hardened below and diverging upwards; the glumes are close together and subulate-acuminate but otherwise very dissimilar—the lower membranous, flat on the back and strongly nerved, the upper much hardened in the lower half and there very convex, smooth and inconspicuously nerved; the lodicules are thick; there are 2 distinct or nearly distinct styles; the spikelets are all well developed or the bottom one slightly reduced; the culms are dimorphic, some few-noded and ± branched others stoloniform with up to many nodes; the leaves are scarcely constricted at base. The well marked differences between these groups in habit, glumes, fertile floret and flower lead to the conclusion that they are generically distinct. As mentioned previously most of the accounts of this group have been based chiefly on *N. alopecuroidea*. Bentham, Ic. Pl. sub t. 1241 (1877) stated that *Neurachne* " has been generally placed amongst Paniceae, but the very reduced thin and hyaline flowering glume [lemma] and palea, notwithstanding the absence of any twisted awn, appear to me to be characteristic of the Andropogoneae, where it would take its place near *Perotis* and a few other genera in which the spikelets are arranged all round the rhachis of a simple spike or raceme ". It was placed in the Zoysieae which Bentham treated as panicoid because the spikelets disarticulated as a whole. Hackel (1887) followed Bentham. Pilger, Natürl. Pfl.-fam. ed 2, 14e: 40 (1940) placed it in Panicodeae-Paniceae-Panicinae and Gardner, Fl. W. Aust. 1:10 in key (1952) segregated it as constituting a series Neurachnastrae of the Paniceae although he did not validly publish this name. Like Bentham, Pilger and Gardner did not appreciate the differences in the fertile florets between the species they dealt with.

Because the 2-flowered spikelet has the upper floret fertile and the lower male or barren, is dorsally compressed and falls entire there can be no doubt that the group belongs in the Panicoideae in the older sense (i.e. before Pilger segregated the Andropogoneae as a separate subfamily), but its closer affinities are obscure. The fertile floret of *N. mitchelliana* and its allies and *N. muelleri* with the indurated lemma embracing the palea is of the same general structure as that of some genera of the Panicineae, especially *Uranthoecium* and *Xerochloa* and that of *N. alopecuroidea* could perhaps be compared with *Hymenachne* but the flat hyaline lemma of *N. munroi* is not like that of any other genus of the Panicineae and the bearded base does not accord. The subequal 2-keeled more or less hardened glumes ± longer than the florets and in some species harder than the upper lemma are very different from the glumes of any of the Panicoideae of Pilger's later classification (although the much smaller glumes of *Uranthoecium* are ± 2-keeled in the upper part); the lower glume is comparable with that of some of the Andropogoneae such as *Sehima* but the upper glume and both florets do not agree while the inflorescence is different from that found in either group except in the African genus *Snowdenia* and elsewhere is found only (or almost only?) in the Peroteae and Zoysieae. The simple starch grains, absence of an epiblast and the epidermis and anatomy of the leaf are undoubtedly panicoid (eu-panicoid) in character (Fig. 7) but the absence of a well-defined midrib in the closely nerved leaf (as in the Peroteae and Zoysieae which however have the chloridoid type of epidermis and anatomy) further distinguish the taxon from the Andropogoneae and Paniceae. Therefore a new tribe must be described for this group of genera. Because of the panicinoid structure of the fertile floret of some of the species it seems better to arrange the tribe in the Panicoideae of Pilger's later classification than to treat it as distinct from both Panicoideae and Andropogonoideae as a separate subfamily.

Neurachneae S. T. Blake, tribus novus Panicoidearum characteribus sequentibus distinguendus: spiculae brevissime pedicellatae in rhachi racemi simplicis terminalis undique sitae, a dorso compressae, haud vere aristatae, basi barbatae; glumae subaequales saltem superior anthoecia ± superans, bicarinatae, basin versus plus minusve induratae; anthoecium inferum masculum vel sterile ejus lemma ± 2-carinatum basin versus induratum; anthoecium superum hermaphroditum, ejus lemma marginibus planis tenuissimis; styli 2 vel 3; foliorum costa ab nervis aliis vix dissimilis. Typus: *Neurachne* R. Br.

Spikelets falling entire, very shortly pedicellate, spirally arranged around the axis of a simple terminal raceme, 2-flowered, dorsally compressed, not truly awned, bearded at the base; glumes subequal at least the upper exceeding the florets, 2-keeled, ± indurated towards the base; lower floret male or neuter, its lemma ± 2-keeled and hardened towards the base; upper floret bisexual, its lemma with very thin flat margins; styles 2 or 3; leaf-blade many-nerved with undifferentiated midrib. Culms solid. Leaf with double bundle-sheath, radially arranged chlorenchyma and fan-shaped groups of bulliform and colourless cells, the middle one gradually the largest;

epidermis with dumb-bell-shaped or nodular silica bodies, long microhairs with a tapering upper cell narrower and about as long as the lower, long cells with markedly sinuous walls and stomata with triangular (? or also subtriangular) guard cells. Grain with very thin pericarp and testa; hilum small, basal; embryo large, about $\frac{1}{2}$–$\frac{3}{4}$ as long as the grain, with scutellar tail and no epiblast, its vasculature not satisfactorily determined but apparently panicoid; starch grains mostly simple, sometimes twinned. First leaf of seedling oblique, narrowly elliptic, several-nerved.

KEY TO GENERA OF NEURACHNEAE

- Glumes, at least the upper subulate-acuminate, at least the lower strongly nerved throughout its length without a hyaline vertical depressed area in the lower half and without tubercles and bristles on the back; upper glume with an oblique submarginal dense line of long fine hairs; lower floret ± exceeding the upper, its lemma flat or ± gibbous below; upper floret acute or acuminate but not rostrate; leaf-blades without a short petiole-like base:
  - Glumes much alike in texture ± flattened on back; lower lemma embracing the upper for the greater part; upper floret acute; lemma of upper floret membranous to very thinly membranous and then hyaline; stigmas 3, or 2 with a rudiment; culms mostly simple from a branched base, erect; often many lower spikelets reduced *Neurachne*
  - Glumes unlike, lower membranous and flat on the back, upper convex in the lower half and there much hardened, smooth and inconspicuously nerved; lower lemma very gibbous below and ± sharply bent outward in upper part; upper floret acuminate, the lemma and palea indurated and ± rugulose; styles 2; culms mostly branched, some stoloniform; lower spikelets scarcely reduced *Paraneurachne*
- Glumes narrowly rounded to subtruncate in outline commonly ± 3-denticulate, the lower with a much depressed vertical hyaline "window" in the lower half with a thick transverse ridge immediately above bearing stout bristles, upper much hardened and convex in the lower $\frac{1}{2}$–$\frac{2}{3}$ with a submarginal series of stout tubercles sometimes meeting on the back of the top of the hardened region and bearing stout bristles with or without abundant long slender hairs added; lower lemma shorter than and tightly appressed to and embracing the upper floret; upper floret rostrate-acuminate, the lemma and palea indurated and smooth below the beak; styles 2, distinct; culms often several-noded; leaf-blades abruptly constricted at base, often with a short pseudopetiole between blade and sheath *Thyridolepis*

NEURACHNE

Neurachne R. Br. Prodr. 196 (1810); Nees, Pl. Preiss. 2: 95 (1846); Benth. Ic. Pl. sub t. 1241 (1877), Fl. Aust. 7: 507 (1878), in Benth. & Hook. Gen. Pl. 3 : 1123 (1883); Hack. Natürl. Pfl.-fam. II, 2 : 31 (1887); J. Vickery, Proc. Linn. Soc. N.S.W. 60 : 366–9 (1935) and Contr. N.S.W. Nat. Herb. Flora Ser. 19 (1) : 4, 72 (1961); Pilger, Natürl. Pfl.-fam. ed. 2, 14e : 40 (1940); Gardner, Fl. W. Aust. 1 (1) : 10, 271 (1952); Lazarides, The Grasses of Central Australia 178 (1970). Type: *N. alopecuroidea* R. Br.

Panicum L. sect. *Stachypanicum* F. Muell. Fragm. Phyt. Aust. 5: 204 (1867). Type: *P. munroi* F. Muell. (*Neurachne munroi* (F. Muell.) F. Muell.)

Spikelets abaxial, solitary, disarticulating from short pedicels spirally arranged in a simple terminal raceme, narrowly ovate acuminate, dorsally compressed, bearded at the obtuse base, 2-flowered, the lower male (or neuter), the upper hermaphrodite; rhachilla with very short internodes not produced beyond the second floret. Glumes longer than the florets, diverging upwards, narrowly ovate, ± acuminate, rigidly membranous but ± indurated below especially in fruit, stoutly several-nerved, 2-keeled at least in the upper part, flat on the back or convex towards the base; lower 5–7-nerved with prominent hyaline margins in the lower part ± ciliate; upper subulate-acuminate, 7–11-nerved with a dense narrow beard of long hairs on each side in the lower part extending obliquely from the margin near the base to about halfway to the middle. Lower floret male (or neuter) narrowly ovate, ± acute, flat on the back or slightly gibbous in the lower $\frac{1}{3}$; lemma resembling or thinner than the glumes in texture or ± coriaceous towards the base with hyaline margins embracing the upper floret for the greater part, 5–7-nerved, 2-keeled with the margins inflexed upwards and ± ciliate; palea up to as long as the lemma; lodicules 2; stamens 3. Upper floret as long as or a little shorter than the lower, narrowly ovate, acute, compressed; lemma firmly or thinly membranous to hyaline, 5–1-nerved (rarely nerveless) with flat thinly hyaline ciliate margins, longer or shorter than the palea; palea 2-nerved at least below, free or embraced by the lemma and similar to it in texture. Lodicules 2, cuneate, ± 3-toothed, faintly nerved. Stamens 3; anthers linear, glabrous. Ovary glabrous, obovate or elliptic-oblong in outline; styles 3, widened and ± united at base, one commonly reduced to a small point or ridge; stigmas plumose, yellow or purple, laterally exserted. Grain narrowly obovate-elliptic in outline, much compressed with a terminal ± triquetrous appendage (style-base), glabrous; embryo elliptic, about half as long as the grain; hilum basal, punctiform.—Densely tufted leafy grasses with short horizontal rhizomes; primary erect shoots extravaginal, closely noded, each terminated by a tuft of usually few-noded flowering culms and intravaginal innovations; leaves many mostly at the base, with convolute sheaths rounded on the back, the blades linear to very narrowly linear, very little narrowed to base narrower than and abruptly widened to the sheath, convolute in bud, at length often flat or incurved, closely and evenly many-nerved with the midrib scarcely differentiated, persisting; ligule a dense fringe of hairs; collar sometimes ± bearded; inflorescence a well exserted short spike-like raceme with ± erect spikelets of which several of the lowermost are much reduced, closer together and more persistent; axis angular, straight or nearly so; pedicels very short or minute with slightly expanded, horizontal or oblique, concave glabrous tips.

Six species in the southern half of the Australian mainland, one of them extending north of the Tropic of Capricorn in Queensland and the Northern Territory (Fig. 8).

KEY TO SPECIES OF NEURACHNE

Lower glume 5-nerved in the lower half, the nerves distinct from the base; spikelets ± evenly spaced above the small basal ones, not in groups; inflorescence ± ovoid or shortly oblong; culm-nodes pubescent:

Spikelets (with their awnlets) 8–13 mm long, with the longer hairs 2–4 mm long; upper floret 5–8·5 mm long; leaf-sheaths glabrous inside:

Sheaths not woolly outside; blades often flat, up to 8 cm long; upper floret 5–6·4 mm long *N. alopecuroidea*

Sheaths densely woolly outside; blades ± convolute-terete, up to 13 cm long; upper floret 8–8·5 mm long *N. lanigera*

Spikelets (with their awnlets) 5·5–6·5 mm long, with the longer hairs 1–1·5 mm long; upper floret ± 4·5 mm long; leaf-sheaths hairy inside *N. minor*

Lower glume 3-ribbed in the lower half on the back, often ± 5- or 7-nerved inside; many spikelets approximated in groups of 2–5 or else with a muticous lower glume in narrowly oblong inflorescences 2·5–5·5 cm long; one species with glabrous culm-nodes:

  Culm-nodes pubescent; leaves with some long hairs at least when young, the blades usually not more than 15 cm long; spikelets 5–7 mm long:

    Lower glume muticous; spikelets not in groups; upper lemma thinly membranous to hyaline, nerveless or 1-nerved or also with 2 short lateral nerves *N. munroi*

    Lower glume aristulate; spikelets in groups; upper lemma firmly membranous, ± conspicuously 3-nerved with the lateral nerves nearly percurrent and sometimes with and additional short pair *N. queenslandica*

  Culm-nodes glabrous; leaves usually without long hairs, the blades inrolled- or convolute-terete, slender, 10–25 cm long; spikelets 7–11 mm long *N. tenuifolia*

Neurachne alopecuroidea R. Br. Prodr. 196 (1810); Nees, Pl. Preiss. 2: 95 (1846); F. Muell. Fragm. Phytogr. Aust. 8: 200 (1874); Benth. Ic. Pl. t. 1241 (1877), Fl. Aust. 7: 507 (1878); J. M. Black, Fl. S. Aust. 57 (1922), ed. 2: 66, Fig. 68 (1943): Gardner, Fl. W. Aust. 1 (1): 271, Pl. 78, A–B (1952); J. H. Willis, Handb. Pl. Vict. 1: 194 (1962); Hj. Eichler, Suppl. Black Fl. S. Aust. ed 2: 42 (1965). Type: Western Australia, King George Sound, *R. Brown* [6142] (BM; photo, BRI).

Panicum alopecuroidea (R. Br.) Spreng. Syst. Veg. 1: 309 (1825) ("*alopecuroides*") non *P. alopecuroides* L. Based on *Neurachne alopecuroidea.*

"*Neurachne phleoides* R. Br. ex Nees" in Hook. London J. Bot. 2: 411 (1843), fide Index Kewensis fasc. 3:310 (1894) and Chase, Index to Grass spp. 438 (1962). See discussion below.

Rhizome short, horizontal. Flowering culms erect up to 50 cm high, 3-noded; nodes densely pubescent; internodes striate, slightly scaberulous or smooth otherwise glabrous or sparsely and shortly hairy from tubercles, uppermost slightly widened beneath the inflorescence and antrosely scabrous-puberulous in the upper part. Leaf-sheaths ciliate and ± bearded at the orifice, the lower ones ± indurated, faintly striate and pubescent below, glabrescent and more striate upwards, the culm-sheaths striate and glabrous except for the margins, ± inflated, the upper shorter the lower often longer than the internodes all smooth or shortly and sparsely scabrous-pubescent from tubercles; collar glabrous or sometimes ± pubescent on the lower basal leaves; hairs of ligule ± 0·6–0·8 mm long; blades at length flat or with inrolled margins or convolute at the tip, acute, scaberulous on the margins, variously pubescent or pilose on the upper or both sides, also sparsely pilose on margins and lower or both sides with longer slender tubercle-based hairs, about 1·6–8 cm long and 2–3·2 mm wide, 13–19-nerved. Inflorescence oblong-cylindrical or ± ellipsoid to very broadly ovoid, 1·5–3·3 cm long, 1·2–1·8 cm wide; axis and pedicels villous, the latter 0·4–0·55 mm long with horizontal or slightly oblique tips, those of the reduced basal spikelets almost 0. Spikelets 8–11 mm long, about 1·5–2 mm wide, dull greyish green or blackish green with white hairs; longer hairs of basal beard 2·4–3 mm long. Lower glume 7–10·2 mm long up to 2 mm shorter than the spikelet, gradually passing into a subulate scabrid tip 0·9–2 mm long, somewhat widened near the base with hyaline scarious margins embracing the base of the upper glume, the back narrowly ovate, 5-nerved with the 2 outermost nerves on each side closer to one another, the outermost disappearing about the middle, the next pair becoming the keel-nerves, pilose to ± villous or pubescent on the back, pubescent inside in the upper part, shortly ciliate from the margins, ciliate with longer rigid hairs from small tubercles on the keels, these hairs increasing in length upwards and then diminishing, the longer ones up to 1·7–2·5 mm long. Upper glume reaching to the tip of the spikelet, the subulate scabrid tip 1·2–2·3 mm long, stoutly 9–11-nerved, hairs of the beard up to 2·5–4 mm long, elsewhere loosely pilose to pubescent on the back, pubescent inside in the upper part. Lower floret, 5·1–7·6 mm long, much convex in profile in the lower part, slightly gibbous, acute; lemma herbaceous above, coriaceous below, resembling the upper glume in texture, stoutly 7-nerved, ± pubescent on the back; palea narrowly oblong-ovate, 2·5–3·9 mm long, about 2/5–3/5 as long as the lemma, hardened and 2-keeled in the lower part, elsewhere hyaline and nerveless, ciliate at the ± jagged tip. Upper floret equal to or a little (up to 1·2 mm) shorter than the lower floret, 5–6·4 mm long, 1·2–1·5 mm wide; lemma thinly to firmly membranous, narrowly ovate acute when flattened, 3–, 4–, or 5-nerved, the mid-nerve percurrent, two others disappearing shortly below the tip, the other or others often shorter; palea a little (up to 0·5 mm) shorter to a very little (up to 0·25 mm) longer than the lemma, similar to it in texture and entirely embraced by its margins, margins incurved below, inflexed above, nerves close together at the ± emarginate tip, narrowly ovate acute when flattened. Anthers 2·2–2·65 mm long. Grain about 2·6 mm long and 1·4 mm wide. Lower spikelets reduced to the ± subulate lower glume enclosing a smaller upper glume and minute lemmas.—Figs. 1, 8.

WESTERN AUSTRALIA.—Without further locality, *Drummond, Maxwell*; " interior of Western Australia " in 1889, *A. Adams*. South-West Province: Irwin District: Between Northampton and Lynton, Sept. 1940, *Blackall*; Bowes, Nov. 1903, *Morrison*; Buller R., N. of Geraldton, Sept. 1947, *Blake* 18081; Champion Bay, in 1873, *Gray*, in 1889, *V. Sewell*; Three Springs, Oct. 1912, *Stoward* 213; Carnamah, Sept. 1947, *Blake* 18051; W. of Wubin, Sept. 1938, *Blackall* 3831. Darling District: 1 km N. of Badgingarra by Hill R., Nov. 1965, *Wilson* 3786; Midland–Toodyay road, Red Hill, Aug. 1961, *Aplin* 903; Upper Swan R., in 1881, *Forrest*, in 1883, *J. Sewell*; Middle Swan R., in 1894, *J. Sewell;* Swan R., in 1839, *Drummond*; [Perth, Aug. 1839], *Preiss* 1840; Guilford, Aug. 1897, *Helms*, Aug, 1903, *Andrews;* Swan View to Midland Junction, Dec. 1903, *Morrison;* Midland Junction, Sept. 1900, *Fitzgerald* NSW 25026; John Forrest National Park, Sept. 1967, *R. & R. Belcher* 131; Darlington, Nov. 1927, *White* 5233, Oct. 1949, *Roack*; Welshpool to Kalamunda, Sept. 1909, *Maiden* NSW 25008; Cannington, Oct. 1909, *Morrison*; Cannington, Aug. 1947, *Blake* 17997; Serpentine Falls, Aug. 1955, *Green* 358; Wooroloo, Oct. 1907, *Koch* 1734; Kelmscott, Sept. 1897, *Helms*; Wungong Gorge near Armadale, Aug. 1947, *Blake* 18018; Mundaring Dam, Sept. 1947, *Jessep*; Pinjarrah, Sept. 1897, *Helms;* Sampsons Brook, Oct. 1902, *Berthoud;* 1 mile N. of Yarloop, Oct. 1967, *R. & R. Belcher* 256; Harvey, Oct. 1911, *Stoward* NSW 25009; Tone R., *Oldfield* 665. Avon District: Moora, Oct. 1908, *Cleland* NSW 25021; 8–10 miles E. of Calingiri on Wongan Hills road, Sept. 1958, *Aplin* 158; 3–4 miles from Northam, Sept. 1949, *Salasoo* 85; 7 miles from Dowerin towards Goomalling, Sept. 1962, *Phillips* NSW 82362; Muresk, Sept. 1945, *E. T. Bailey* 401; Kellerberrin, Sept. 1897, *Leake*; Cunderdin, Sept. 1908, *Cleland* NSW 25007; Youndegin, in 1894, *Eaton*, Oct. 1945, *Gardner;* Tammin, Sept. 1909, *Maiden* NSW 25006; Mt. Caroline, in 1889, *G. Sewell;* Pingelly, May 1908, comm. *Grasby* NSW 25013; Reserve 17 miles E. of Pingelly, Oct. 1960, *Aplin* 776. Warren District: Vasse R., *Oldfield;* Busselton, Nov. 1911, *Stoward*

NSW 25025; Blackwood R., in 1875, *Hester*, and in 1880, *McHard*. Stirling District: Narrogin, Aug. 1959, *Blake* 20767; 5 miles W. of Wagin, Oct. 1962, *Beard* 2109; Wagin, Sept. 1928, *Lucas* NSW 25020; below Jilakin Rock, Oct. 1959, *Malcolm* 2485; ca. 20 km N. of Cranbrook, Sept. 1964, *Kuchel* 1994; 2 miles SW. of Ongerup, Sept. 1963, *Newbey* 978; King George Sound, [Sept.–Oct. 1791], *Menzies*, [Dec. 1801] *R. Brown*, also *Muir* and Oct. 1867, *Mueller;* Albany, Mt. Melville, Oct. 1857, *Mueller*; Albany, Sept. 1867, *Mueller*; Albany, Mt. Clarence, Nov. 1927, *White* 5330. Eyre District: Bremer R. in 1884, *Webb;* Bremer Bay, Dec. 1919, *Wellstead* NSW 25028; Thumb Peak Range, Oct. 1965, *George* 7132; 1½ miles N. of Ravensthorpe, Sept. 1947, *Willis*; Young R., Ravensthorpe–Esperance road, Sept. 1968, *Jackson* 1304; S. of Grasspatch, Sept. 1947, *Willis;* ± 50 km E. of Esperance, Sept. 1964, *Kuchel* 1666; few miles N. of Howick Hill, Nov. 1962, *Supt. Plant Res. Div.*; Israelite Bay, in 1885, *Brooke*, Sept. 1915, *Brooks* NSW 25005. Eremean Province: Coolgardie District: Muntadgin, Sept. 1945, *E. T. Bailey* 178; Parker Range, in 1892, *Merrall*.

SOUTH AUSTRALIA.—Eyre Peninsula: Gawler Ranges W. of Yardea, Oct. 1953, *Cleland*; between Port Lincoln and Streaky Bay, in 1882, *Richards*; Hambridge National Park, NE. of Locke, Oct. 1966, *Kraehenbuehl* 2054, Nov. 1960, *Specht* 2425; Flora and Fauna Reserve, Hundred of Hincks, E. of Tooligie Hill, Dec. 1959, *Cleland*, Nov. 1960 *Specht* 2618; Hincks National Park, Northern Blue Range, Oct. 1968, *Wheeler* 1044, and summit of Verran Hill, Oct. 1968, *Wheeler* 738; Hundred of Wanilla, ± 25 km NNW. of Port Lincoln, Oct. 1966, *Alcock* 1205; Green Hatch, NW. of Port Lincoln, Oct. 1958, *Wilson* 432; Kirton Point at Port Lincoln, Dec. 1935, *J. M. & A. D. Black*. Yorke Peninsula: Moonta, in 1888, *Beythuir* 95; ± 6 km SSE. of Moonta, Sept. 1967, *Blaylock* 771; Hundred of Curramulka ± S. of Moonta, Oct. 1967, *Blaylock* 694. Flinders Range: Hughes Gap, W. of Gladstone, Sept. 1906, *hb. J. M. Black*. Mt. Lofty Range: Gladstone, Oct. 1915, *hb. J. M. Black;* Central Tothill Range, Oct. 1967, *Kraehenbuehl* 2157; Hamilton, Oct. 1926, *Hamilton School;* Gawler, *Mueller;* Sandy Creek, Sept. 1966, *Fagg* 223; Tanunda, Oct. 1966, *Kraehenbuehl* 1669; Bethany, Sept. 1848, *Mueller;* Nuriootpa, Oct. 1966, *Kraehenbuehl* 1697; Freeling, Sept. 1966, *Kraehenbuehl* 1740; Blumberg (=Birdwood), Dec. 1882, *hb. Tate;* Mt. Lofty Ranges, Feb. 1897, *Menzel*; foothills of Mt. Lofty Ranges, Nov. 1848 (*?*), *Mueller;* Torrens Gorge, Nov. 1879, *hb. Tate;* Torrens Gorge, western end, Sept. 1968, *Spooner* 208; Adelaide plains and hills, Nov. 1903, *hb. J. M. Black;* near Adelaide, in 1898, *Cleland* NSW 25010; Morialta, Nov. 1938, *Vickery* NSW 25023; Burnside, Oct. 1904, *hb. J. M. Black;* Blackheath, Oct. 1918, *Andrews;* Blackwood, Oct. 1893, *Brummitt* and Oct. 1905, *hb. J. M. Black*; National Park, Belair, Oct. 1935, *Cleland*, and Sept. 1959, *Harris;* Clarendon, Nov. 1882, *Tepper* 1107, and Oct. 1920, *Cleland;* near Echunga, Oct. 1961, *Parsons* 69; Manning Reserve near McLaren Flat, Oct. 1963, *Jackson* 576; Kuitpo, Aug. 1928, *Cleland;* near Wickham Hill, Dec. 1958, *Schodde* 1041. Fleurieu Peninsula: Encounter Bay, Jan. 1926, *Cleland*. Lower River Murray: Reedy Creek, Dec. 1861, *Beckler* 159; Yumali, Sept. 1917, *hb. J. M. Black;* Meningie, Sept. 1945, *Williams* 146; S. of Meningie along Coorong Road, Nov. 1958, *Cleland*. South-East: Dark Island heath NE. of Keith, Dec. 1950, *Specht & Rayson* 5; between The Gap and Western Flat, Oct. 1961, *Hunt* 223; Bordertown road between Naracoorte and Bordertown, Sept. 1962, *Hunt* 1179; Big Heath National Park (SW. of Naracoorte), Nov. 1969, *Weber* 1679, 1843, and Nov. 1969, *Alcock* 2862; Yallum Station W. of Penola, Nov. 1894, *hb. Tate*. Kangaroo Island: Between Kingscote and Vivonne Bay, Nov. 1924, *Cleland*. South Australia, without definite locality, *hb. Schomburgk*.

VICTORIA.—Wimmera: ± 4 miles N. of Serviceton North against border fence, Sept. 1948, *Willis;* near Kiata National Park, Sept. 1969, *Henshall* NSW 120340; Mitre Lake, Nov. 1887, *hb. Walter*; shire of Dimboola, Sept. 1887, *Reader;* Brimpaen road 21 miles S. of Horsham, Oct. 1960, *Muir* 1575; Stawell, in 1893, *Matthews;* Wimmera, *Dallachy*; South Wimmera, in 1898, *Macpherson*. Western District: Grampians, *Sullivan*, Nov. 1901, *Williamson* NSW 25015; Mt. Abrupt, May 1899, *Williamson* 650. Northern District: Lower Loddon, Nov. 1887, *Walter* NSW 25016.

Neurachne alopecuroidea has been reported from a considerable range of habitats from stony hillsides in open Eucalyptus forest (woodland) to wet sandy heaths and in *Acacia* scrub.

Brown [6142] (BM) marked " Type Specimen " is strictly a lectotype. On board the " Investigator " Brown had a specimen from the earlier collection by Menzies and had drawn up a description from this during the voyage to Australia (on 26 Aug. 1801 according to his note on the specimen). Using his own specimens he drew up a revised description on 14 Dec. 1802 (Brown MS.) in which he stated that the stamens were described from the specimen collected by Menzies while the description of the grain must have been drawn up from his own specimens on which he was able to find one filament only. The published account includes descriptions of stamens and grain. The epithet was spelt *alopecuroidea* on the labels, in the MS. and in the Prodromus, but there is a second sheet of Menzies (BM) labelled by Brown with the epithet spelt *alopecuroides* with a reference to the Prodromus.

(For an account of Brown's methods and an explanation of the numbers associated with his collections see Burbidge, Proc. Linn. Soc. N.S.W. 80: 229–233 (1956), Stearn, Introduction to Robert Brown: Prodromus Florae Novae Hollandiae, Facsimile Ed. (1960) and Blake, Proc. Roy. Soc. Qd 80: 55–6 (1969)).

The epithet has been commonly spelt *alopecuroides* until Willis, loc. cit., used the original spelling. The name " *Neurachne phleoides* R.Br." was accompanied by a diagnosis immediately after the original description of *N. mitchelliana*. After this description, Nees wrote:

> Adn. *Neurachne phleoides* R. Br. definienda est ;
>
> N. (*phleoides*) glumis subulato-acuminatis imberbibus ciliatis.
>
> Spinifex *hirsutus ?* sterilis. V. D. L. *Gunn n.* 584.

All is part of a list of determinations by Nees of specimens of grasses from Australia sent by Lindley. Chase, Index of Grass Spp. 438 seems not to have noticed this and cited *Gunn* 584 as the type of *N. phleoides* R.Br. ex Nees without realizing that this number was determined by Nees as *Spinifex hirsutus*?, though it is difficult to see how a diagnosis referring to spikelets could be reconciled with the statement that *Gunn* 584 was sterile. In the Lindley Herbarium (CGE) there is a single specimen written up by Nees as *Neurachne phleoides* R.Br. This is the specimen collected by *Drummond* in 1839 cited above and *phleoides* must surely be a slip of the pen for *alopecuroides.*

Neurachne lanigera S. T. Blake; species nova affinis *N. alopecuroideae* R.Br. sed vaginis dense lanatis anthoeciis longioribus pro ratione angustioribus praecipue differt.—Typus: Australia Occidentali, prope " Cunya ", *Speck* 1201 (holotypus CANB. 72644).

Gramen perenne caespitosum dense foliosum, innovationibus intravaginalibus. Culmi ± 15–30 cm alti, 1–2-nodi, simplices, nodis dense pubescentibus ± geniculati, internodiis glabri vel infimo puberuli, ± striati ceterum laeves. Foliorum vaginae inferiores dense lanatae, eae foliorum caulinorum striatae, marginibus lanato-ciliatae alibi ± pubescentes, ore barbatae, internodiis pro more breviores; collum ± pubescens; ligulae pili densi ± 1 mm longi; laminae basi minime sensimque angustatae in vaginam abrupte dilatatae, acutissimae, fere rectae, laxe ± involutae in aetate ±

planae, pilis usque ad 2·5 mm longis e tuberculis ortis ± hirsutae utrinque quoque pubescentes vel glabrescentes, crebre valideque 13–17-nervi nervis vix dissimilibus, ± 8–13 cm longae, explanatae 0·9–2 mm latae. Inflorescentia sordide viridis, oblonga, densa, 3–4 cm longa, 1·5–2 cm lata, 8–18 spiculis perfectis atque paucis basi sitis ± valde reductis composita; axis flexuosa, angulata, striata, pubescens; pedicelli admodum clavati, apice minime obliquo glabri, inferne angulati pubescentesque, 0·5–0·7 mm longi, ± 0·8–2·3 mm distantes. Spiculae 9·5–13 mm longae, 1·7–2 mm latae, anguste ovatae acuminatae, basi pilis usque ad 3 mm longis barbatae. Gluma inferior ultra medium a basi 5-nervis, ubique pubescens, apice ecarinato 2·8–3·5 longo scabra, basin versus pilis longis praedita, marginibus prope basin late hyalinis glabra sursum fere ad apicem pilis quoad longitudine crassitieque diversis plerisque e tuberculis parvis ortis dense longeque ciliata, apicem versus intus scaberulo-puberula. Gluma superior 9-nervis venulis transversis brevibus raris additis, sursum dense ciliata, pilis basin versus elongatis et nervum medianum appropinquantibus barbam formantibus, apicem ecarinatum 1·8–4 mm longum versus intus breviter pubescens. Anthoecium inferum masculinum, supero usque ad 0·2 mm brevius; lemma 5-nerve, supra medium fere hirsutum, apice pubescens vel scabrum, basin versus pubescens pilis plurimis ad internervia utrinsecus nervum medianum pro more sitis, marginibus ciliatum, parte inferiore excepta nervis carinalibus ciliolatum et prope medium pilis longis praedita; palea ± 1·5–2 mm longa. Anthoecium superum anguste (elliptico-) ovatum sursum anguste triangulare, 8–8·5 mm longum, 1·2–1·4 mm latum; lemma prope medium et sursum breviter ciliatum, dorso superiore scaberulum; palea minime brevior longiorve carinis valde approximantibus, apice sub anthesi libera. Figg. 2A, 3A, 8.

Densely leafy tufted grass without (?) a horizontal rhizome, densely woolly at the base with very few membranous cataphylls. Culms ± 15–30 cm high, 1–2-noded, simple, densely pubescent and ± geniculate at the nodes, the internodes glabrous or the bottom one puberulous, ± striate otherwise smooth, glabrous beneath the inflorescence. Leaves: lower sheaths densely woolly pubescent, those of the culm-leaves striate with woolly-ciliate margins and ± pubescent elsewhere, bearded at the mouth, mostly shorter than the internodes; collar ± pubescent but not conspicuously different from sheath and blade; ligule of dense hairs about 1 mm long; blades very acute, about straight, laxly ± involute, ± flat when old, ± hirsute with tubercle-based hairs up to 2·5 mm long and also pubescent on both surfaces to glabrescent, closely and stoutly veined with 13–17 nerves which are much alike, ± 8–13 cm long, 0·9–2 mm wide when flattened. Inflorescence oblong, dense, 3–4 cm long, 1·5–2 cm wide, dirty green, with ± 8–18 perfect spikelets and a few more at the base ± greatly reduced; axis flexuous, striate, pubescent; pedicels somewhat clavate with nearly horizontal tips, angular and pubescent below, 0·5–0·7 mm long, ± 0·8–2·3 mm apart. Spikelets 9·5–13 mm long, 1·7–2 mm wide, hairs of basal beard up to 3 mm long. Lower glume 5-nerved to beyond the middle, the awnlet 2·8–3·5 mm long, shortly pubescent all over outside becoming scabrous at the tip and with longer hairs towards the base, margins broadly hyaline and glabrous near the base densely long ciliate above to near the tip, the hairs of different lengths and widths mostly from small tubercles, scaberulous-puberulous inside towards the tip. Upper glume 9-nerved with a very occasional cross vein connecting inner neighbouring nerves, the unkeeled tip 1·8–4 mm long, densely ciliate upwards, the hairs increasing in length downwards and also forming a dense beard extending towards the midveins, shortly pubescent inside towards the tip. Lower floret shorter than upper by ± 0·2 mm; lemma 5-nerved, almost hirsute above the middle, pubescent to scabrous at the tip, pubescent towards the base with the hairs tending to be restricted to the internerves on each side of the midnerve, margins ciliate in the upper part, keel-nerves ciliate except towards the base and with some long hairs near the middle; palea ± 1·5–2 mm long. Upper floret narrowly elliptic-ovate with the upper part narrowly triangular, 8–8·5 mm long, 1·2–1·4 mm wide; lemma with shortly ciliate margins from about the middle upwards, scaberulous on the back in the upper part; palea very little shorter to just longer, with the keels nearly meeting, the tip free in flower; stigmas purple. Figs. 2A, 3A, 8.

WESTERN AUSTRALIA.—Eremean Province: Austin District: 12 miles S. of Cunyu Homestead, spinifex plain, Aug. 1958, *Speck* 1201.

SOUTH AUSTRALIA.—Far North West: near Mt. Watson, July 1891, *Helms*.

Differs from *N. alopecuroidea* in the densely woolly leaf-sheaths, less hirsute glumes with much shorter hairs inside, longer relatively narrower florets the lower of which is more hirsute on the lemma and has a shorter palea.

Neurachne minor S. T. Blake; species nova affinis *N. alopecuroideae* R.Br. sed spiculis minoribus pilis brevioribus indutis, gluma superiore pro ratione latiore tenuius nervosa, pedicellorum apice valde obliquo, foliorum angustiorum vaginis intus laxe pilosis nec glabris praecipue differt. Typus: " Carnegie " in Australia occidentali, *Bennett* 221 (PERTH, holotypus; BRI.129040, is.).

Gramen perenne caespitosum dense foliosum innovationibus mixtis. Culmi ± 15–30 cm alti, 1–2-nodes, simplices, nodis barbati, internodiis sub nodis et sub inflorescentia scaberuli. Foliorum vaginae striatae ceterum laeves, ciliatae, ore ± barbatae, nodos versus pilis crispis appressis indutae, sursum dorso glabrae intus conspicue pilosae, caulinae internodiis breviores; collum obscurum glabrum; ligulae pili 0·7–0·8 mm longi; laminae fere rectae vel curvatae vel leviter flexuosae, rigidae, convolutae et fere pungentes vel ± canaliculatae, crebre 9–11-nerves, subtus et marginibus pilos e tuberculis ortos 2–4·5 mm longos rigidos raros gerentes vel glabrae etiam laeves vel marginibus nervisque nonnullis parce scaberulae, facie superiore pubescentes vel breviter villosae, pleraeque 6–10 cm longae ± 0·5–0·8 (explanatae 1·5–2) mm latae. Inflorescentia oblonga vel ovoideo-oblonga, 12–16 mm longa 7–12 mm lata; axis pedicellique villosi; pedicelli haud glomerati, apice valde obliqui, ± 0·15 mm longi. Spiculae 5·5–6·5 mm longae 1·3–1·5 mm latae; pili basales longiores ± 1·5–1·6 mm longi; calli cicatrix perobliqua. Gluma inferior quam spicula 1–1·5 mm brevior, in apicem angustissimum planum scabrum ± 0·7–1·3 mm longum sensim transiens, marginibus inferioribus hyalinis sursum sensim angustatis ciliolata, dorso angustissime ovato 5-nervis nervis fere aequidistantibus, internerviis minutissime tuberculata et e tuberculis nonnullis pilosa, secus nervos carinales pilis ± 1 mm longis e tuberculis minutis ortis dense ciliata, pilis sursum inferneque gradatim brevioribus. Gluma superior spiculam adaequans infra aristulam 1–1·4 mm longam ovata (explanata), 13-nervis nervis pro ratione tenuibus externis brevibus, prope margines pilis ± 1·5 mm longis dense barbata, dorso longe pilosa, parte superiore intus pubescens. Anthoecium inferum spicula 1·3–1·7 mm brevius, acutum, a latere visum parte inferiore valde convexum subgibbosum; lemma sursum herbaceum inferne coriaceum quoad textura glumae superiori simile, valide 7-nerve, dorso superiore ± pubescens alibi glabrum et laeve; palea minima lata; antherae fere 2·5 mm longae. Anthoecium superum infero aequilongum; lemma tenuiter membranaceum, hyalinum, 3-nerve nervo mediano fere percurrente nervis lateralibus tenuissimis brevioribus; palea firme membranacea lemmate aequilonga et ab eo ± amplexa, marginibus inferne incurva sursum inflexa, apice angustissimo integro nervis se valde approximantibus. Antherae circiter 2·5 mm longae. Caryopsis haud visa. Spiculae imae plures valde approximatae ± sessiles sensim breviores et ad glumam parvam subulatam redactae. Figg. 2B, 3B, 8.

Simply tufted grass without caudices, ± woolly at the base with mixed innovations. Culms erect up to 30 cm high, 1–2-noded above the closely few-noded crisped-hairy base, scaberulous below the nodes and for some distance below the inflorescence. Leaf-sheaths ciliate, more or less bearded at the orifice and with crisped appressed hairs towards the nodes, glabrous upward outside, pilose inside, striate otherwise smooth, shorter than the internodes; collar obscure, glabrous; hairs of ligule ± 0·7–0·8 mm long; blades nearly straight to distinctly curved or slightly flexuous, rigid, convolute-terete and almost pungent or ± canaliculate, closely 9–11-nerved, the lower surface and margins with occasional long rigid tubercle-based hairs 2–4·5 mm long or glabrous, also smooth or sparsely scaberulous on some nerves and the margins, the upper surface pubescent to shortly villous, mostly 6–10 cm long with the topmost sometimes much shorter but sometimes the longest, ± 0·5–0·8 mm wide or when flattened 1·5–2 mm wide. Inflorescence oblong or ovoid-oblong, dense, 12–16 mm long, 7–12 mm wide; axis villous; pedicles not clustered, ± 0·15 mm long with very oblique glabrous tips. Spikelets 5·5–6·5 mm long, 1·3–1·5 mm wide, dull greyish green with white hairs; longer hairs of basal beard ± 1·5–1·6 mm long; callus narrow, the scar very oblique. Lower glume shorter than the spikelet by 1–1·5 mm passing gradually into the scabrous flat awnlet-like tip ± 0·7–1·3 mm long, the hyaline ciliolate margins of the lower part gradually narrowed upward, the back very narrowly ovate 5-nerved with the nerves about equally spaced and distinct to the base, most minutely tuberculate on the internerves and pilose from some of the tubercles, the keel-nerves densely ciliate with hairs from very small tubercles about 1 mm long diminishing towards the base and the tip. Upper glume reaching to the top of the spikelet, the subulate scabrid tip 1–1·4 mm long, ovate below this when flattened, 13-nerved with the nerves relatively slender and the external ones short, densely long pilose over the back between the beards the hairs of which are very dense and ± 1·5 mm long, pubescent inside in the upper part. Lower floret 1·3–1·7 mm shorter than the spikelet, acute, much convex in profile in the lower part; lemma herbaceous above, coriaceous below, stoutly 7-nerved, ± pubescent on the back, smooth; palea very small, broad; anthers almost 2·5 mm long. Upper floret as long as the lower; lemma thinly membranous, hyaline, finely 3-nerved with the midnerve almost percurrent and the lateral nerves shorter and very slender; palea firmly membranous, as long as the lemma and ± embraced by it, the margins incurved below, inflexed above, the nerves close together at the very narrow entire tip. Anthers ± 2·5 mm long. Grain not seen. Several lower spikelets crowded and ± sessile, gradually reduced to a small subulate glume. Figs. 2B, 3B, 8.

WESTERN AUSTRALIA.—Eremean Province: Austin District: N. of Meekatharra, *Gardner* 2347A; near Wiluna (?), Nov. 1968, *Oliver* Z3; NE. of Wiluna on road to Everard Junction, May 1968, *de Graaf* 32, 121 miles E. of Wiluna on road to Wongawol Stn., July 1966, *Fairall* 2124; Carnegie Stn., July 1941, *F. M. Bennett* 221.

This species is noteworthy because of the conspicuously hairy inner surface of the leaf-sheaths. The inflorescence and spikelets are much like those of *N. alopecuroidea* on a smaller scale except that the upper glume is relatively broader and much less stoutly nerved and the florets are relatively somewhat longer; the pedicels also are very oblique at the tip as in *N. munroi*. None of the material seen is past anthesis so it cannot be determined whether the upper lemma becomes firmer in fruit; in flower it is thinner in texture than the palea as in *N. munroi* but this species differs in many characters, among them being the narrower spikelets, muticous lower glume with a different venation, and longer narrower inflorescence.

None of the specimens of *N. minor* have the deeply buried rhizome with erect caudices so frequently produced by *N. alopecuroidea.*

Neurachne munroi (F. Muell.) F. Muell. Fragm. Phyt. Austr. 8: 200 (1874); Benth. in Hook. Ic. Pl. t. 1239 (1877), Fl. Austr. 7: 508 (1878); Maiden, Man. Grasses N.S.W. 67 (1898); J. M. Black, Fl. S. Aust. 57 (1922), ed. 2: 66, Fig. 69 (1943); J. Vickery, Proc. Linn. Soc. N.S.W. 60: 368 (1935) and Contrib. N.S.W. Nat. Herb. Flora Ser. 19 (1): 74 (1961); Hj. Eichler, Suppl. Black Fl. S. Aust. ed. 2: 42 (1965); Lazarides, The Grasses of Central Australia 181, 261 (1970). Based on *Panicum munroi* F. Muell.

Panicum munroi F. Muell. Fragm. Phyt. Austr. 5: 204 (1867). Type: New South Wales, Goginga Mtns. [Scrope Range], *H. Beckler* (holo, MEL; BRI, K).

Rhizome short, horizontal. Culms tufted, erect, 16–40 cm high, much branched shortly above the rhizome, the flowering culms 2–3-noded with densely (± shortly) bearded nodes, ± puberulous or scaberulous to glabrous immediately beneath the inflorescence, the internodes striate otherwise terete, scaberulous, also pubescent or puberulous below the nodes; cataphylls few, woolly at the base. Leaf-sheaths striate, shortly ciliate on the margins, sparsely hairy with slender tubercle-based hairs, the lower ones ± silky-pubescent at least on the lower part, bearded at the mouth, those of the culm-leaves usually much shorter than the internodes; collar pubescent or shortly pubescent; ligular hairs 0·4–0·7 mm long; blades flat or more commonly with ± inrolled margins, straight, recurved or twisted, acute, upper surface densely and minutely hispidulous, lower surface minutely hispidulous chiefly on the sides of the nerves and also sparsely to densely setose-pilose with tubercle-based hairs, especially towards the base, scaberulous on the nerve-like margins, with 3–6 pairs of nerves prominent on the upper surface besides the scarcely more prominent midrib and ± 15–25 ribs beneath, about 2–12 cm long and 1·35–3·5 mm wide. Inflorescence narrowly oblong, silky, about 2·5–5·5 cm long and 0·8–1·4 cm wide; axis pubescent; pedicels 0·1–0·4 mm long, stout with very oblique tips. Spikelets 5·4–6·7 mm long, 1·3–1·4 mm wide, dull grey green with white hairs; hairs of basal beard 1·8–2·3 mm long. Lower glume 5·3–6·3 mm long, as long as the spikelet or up to 0·6 mm shorter, slightly acuminate, acute but the extreme top very narrowly rounded or emarginate, muticous, the hyaline margins shortly embracing the upper glume at the base, inflexed for the greater part and ciliate, back hardened at least below and there ± convex elsewhere flat to shallowly concave, 7-nerved with the 3 lateral nerves on each side confluent below the middle and incurved towards the midvein giving a somewhat spathulate appearance to the glume in back view and producing a furrow on each side of the midvein in the lower part, the keels scaberulous upwards, the back slightly puberulous between the nerves or ± glabrescent or the nerves slightly scaberulous upwards. Upper glume reaching to the top of the spikelet, shortly subulate-acuminate with the point 0·25–0·7 mm long, stoutly 7-nerved with the nerves about equally distributed, internerves membranous above, hardened below and there the glume convex on the back with incurved sides, pubescent and sometimes with a few small warts, the longer hairs of the beard up to 2·3–3 mm long, upper part glabrous or scaberulous. Lower floret 3·7–5 mm long, 0·8–1·1 mm wide, slightly acuminate, narrowly subobtuse, slightly convex on the back below; lemma thinner than the glumes, slightly thickened and indurated near the base at the sides, slightly emarginate at the tip, 5–7-nerved with two lateral nerves on each side approximated in the hardened band at a distance from the midvein and the internerve hyaline with or without a ± developed vein, pubescent near the base, scaberulous-puberulous upwards; palea 1–1·7 mm long, about $\frac{1}{4}$–$\frac{1}{3}$ as long as the lemma, somewhat narrowly ovate, hyaline and ± triangular or lacerate above, firmer and 2-nerved below with incurved flaps; stamens 3. Upper floret shorter than the lower by 0·2–0·8 mm, 3·5–4·2 mm long, 0·8–1 mm wide; lemma thinly membranous and hyaline, slightly thicker and firmer at the base, narrowly or very narrowly elliptic-ovate, obtuse, about flat, ciliate at the top elsewhere glabrous, finely 1- or sub-3-nerved or nerveless; palea longer than the lemma by up to 0·45 mm and not embraced by it, likewise hyaline and flat upwards, but with thickened incurved acute auricles embracing the flower, shortly and faintly 2-nerved at base or to beyond the middle, glabrous. Anthers about 2 mm long. Stigmas sometimes 3. Grain about 2–2·3 mm long and 0·8–1 mm wide excluding the persistent style-base of about 0·25 mm. Figs. 2c, 3c, 8.

Northern Territory.—Barkly Tableland District: 93 miles WSW. of Lake Nash Stn., May 1948, *Perry* 912. Alice Springs District: Alkara No. 2 bore, 20 miles N. of Huckitta homestead, Jan. 1971, *Latz* 1090; Flat Top Hill, 5 miles SW. of Huckitta Outstation, July 1970, *Parker* 231; 1 mile W. of Claraville homestead, Jan. 1971, *Latz* 1156; c. 22 miles S. of Alice Springs, Jan. 1971, *Latz* 1296; 15 miles E. of Renners Rock homestead, Nov. 1954, *Winkworth* 775; 2 miles WNW. of Mt. Ebenezer Stn., Oct. 1956, *Lazarides* 6186, 12 miles SW. of Tempe Downs Stn., Oct. 1956, *Lazarides* 6121; Goyder River, *Basedow* 23 of *Mackay Exploring Expedition.*

Queensland.—Burke District: On Yelvertoft Stn., ± 40 miles about E. of Camooweal, 342 m, June 1946, *Blake* 15966; Barkly Downs Stn., 20° 22′ S., 138° 25′ E., 238 m, May 1947, *Blake* 17940; 14 miles SSE. of Kajabbi, Aug. 1953, *Lazarides* 4010. Gregory North District: 17 miles NE. of Duchess, Mar. 1954, *Lazarides* 4391; on Buckingham Downs Stn., S. of Dajarra, July 1936, *Blake* 12396. Gregory South District: Mt. Howitt Stn., about 70 miles W. of Eromanga, 180–240 m, July 1936, *Blake* 11918. Mitchell District: 16 miles NW. of Longreach, July 1952, *Davidson* 249. Warrego District: 25 miles S. of Adavale, Oct. 1970, *Silcock* S. 327; Tinderry Stn., [± 55 miles SSW. of] Quilpie, Dec. 1961, *Watts;* Cowley Stn., 40 miles E. of Quilpie on road to Charleville, June 1959, *Anson* 19; Myendetta Stn., 40 miles SW. of Charleville, Apr. 1971, *Silcock* S. 344; between Eulo and Thargomindah, May 1939, *Blake* 14094; Wittenburra Stn., 36 miles S. of Eulo, Jan. 1937, *Everist & Smith* 64; ± 11 miles NE. of Eulo, Apr. 1971, *Boyland* 1043.

New South Wales.—Far Western Plains: Goginga Mountains [Scrope Range], Nov., 1860, *Beckler;* Darling River, *coll.?* Western Plains: Fords Bridge, June 1970, *Hand* NSW 126553 Cobar, Feb. 1911 *Haviland*, July 1964, *G. M. Cunningham* NSW 69771.

South Australia.—Far North: Upper Arckaringa Valley, May 1891, *Helms;* ± 20 km S. of Oodnadatta, July 1968, *Lothian* 4880. North-West Plain: Wirraminna, May 1931, *Jenkins.*

Victoria.—Wimmera, *Walter.*

Neurachne munroi has been mostly found on stony ground or on deeper red sandy soils in " mulga " scrub (*Acacia aneura* or other spp.) but also associated with species of *Triodia* and *Acacia* (*Blake* 17940) or *Triodia* and *Eucalyptus* (*Blake* 15966, *Lazarides* 4391). It is noteworthy because of the hyaline sometimes nerveless upper

lemma and the thickened basal auricles of the upper palea as well as the great variability in the length of the leaf-blades on the same plant; in *Lazarides* 4391 the leaves on and at the base of the culms have blades only 1–1·5 cm long, while those of the innovation shoots are up to 6 cm long.

The name of the type locality was discussed by J. H. Willis, Proc. Roy. Soc. Vict. 75: 257, 256, 253 (1962).

Panicum munroi was described in Fasciculus XL of the " Fragmenta " which must have been published early in 1867, not in 1866 as sometimes stated (see S. T. Blake, Proc. Roy. Soc. Qd 74: 50 (1964)).

Neurachne queenslandica S. T. Blake; species nova affinis *N. munroi* (F. Muell.) F. Muell. sed glumis ambabus conspicue aristulatis inferiore basem versus haud constricto dorso plano, lemmate supero quam palea haud breviore conspicue 3–5-nervi, palea basi haud auriculata praecipue differt. Typus: Queensland, Enniskillen Stn., *White* 12746 (BRI.038446).

Culmi erecti, ± 30–50 cm alti, inferne ramosi, florigeri plurinodes, internodiis superne vel omnino dense sericei vel sub inflorescentia minute pubescentes; nodi pubescentes. Foliorum vaginae pleraeque internodiis longiores, striatae, pilis e tuberculis ortis parce pilosae, marginibus solum ad ore ciliatae pilis longis 3 mm excedentibus; collum ± piligerum; ligulae pili 0·4–1·2 mm longi; laminae longe lineares, vel in toto involutae vel ± planae vel apice convolutae, superne scabridae, pilis e tuberculis ortis praecipue subtus marginibusque pilosae, supra autem minutissime hispidulae basin versus pubescentes, ± 8–20 cm longae, applanatae 2–3 mm latae, subtus nervis ± 17 crebre costatae. Inflorescentia anguste oblonga, sordide viridis, ± 2–3 cm longa ± 1 cm lata; axis angulata pubescens; pedicelli saepius 3–5-nim approximati ± 0·2–0·3 mm longi, apice minime obliqui. Spiculae anguste ovatae acuminatae ± 5–7 mm longae ± 1·5 mm latae, basi pilis usque ad 2–2·7 mm longis barbatae. Gluma inferior superiore brevior usque minime longior, anguste ovata subulato-acuminata aristula scabra 1·5–3 mm longa praedita, 5-nervis, nervorum pari laterali utroque intus distincto extus in costam robustam confuso et cum nervo mediano in aristulam confluente, carinis sursum pilis usque ad ± 1·5 mm longis e tuberculis parvis ortis ciliata, dorso ubique intus sursum pubescens. Gluma superior abruptius subulato-acuminata ejus aristula scabrida 1·5–1·8 mm longa, 9 (? vel 7)-nervis nervis basi ± confluentibus, dorso pilosa, superiore parte intus pubescens, barbae dorsalis pilis usque ad 2–2·2 mm longis. Anthoecium inferum ± 4·5–5 mm longum, acutum, piloso-pubescens, tertia parte inferiore admodum gibbosum; lemma quoad textura glumis simile, valide 7-nerve nervis inferne robustioribus inter eos tenuiter membranaceum, internerviis breviter pubescens atque pilosum, parte superiore intus pubescens; palea ± 1·2–1·5 mm longa, bifida vel lacerata, sursum hyalina, inferne rigidior vel tenuiter cartilaginea marginibus inflexa. Anthoecium superum fere aequilongum, 1 mm latum, acutum. Lemma anthoecium adaequans, paleam in majore parte amplectens, firme membranaceum vel tenuissime cartilagineum marginibus planis hyalinis inferne angustis glabris superne latioribus ciliatis, explanatum angustius ovatum acutum, conspicue 3–5-nerve nervo mediano percurrente 2 lateralibus fere percurrentibus reliquis brevioribus vel nullis. Palea lemma adaequans vel eo usque ad 0·4 mm brevior et ei quoad textura similis, omnino 2-carinata inferne multo incurva et florem amplectens, marginibus inferne anguste hyalina superne late hyalina ciliata, applanata angustius ovata acutata apice angustissima emarginata. Lodiculae ± 0·6 mm longae, 0·4 mm latae. Ovarium styli tertii rudimento praeditum. Figg. 2D, 3D, 8.

Culms erect, ± 30–50 cm high, branched below, several-noded, internodes striate, densely silky pubescent at least in the upper part or minutely so beneath the inflorescence, nodes pubescent. Leaves: sheaths mostly longer than the internodes, striate, sparsely pilose with tubercle-based hairs, the margins long ciliate (bearded) only at the orifice with hairs exceeding 3 mm otherwise glabrous; collar not differentiated, sometimes ± hairy; ligule with hairs 0·4–1·2 mm long; blades long linear, inrolled all along or ± flat or ± convolute at tip, scabrid in the upper part, pilose with tubercle-based long hairs chiefly on the lower surface and margins, also ± scabrid, upper surface also very minutely hispidulous and pubescent near base, ± 8–20 cm long, 2–3 mm wide when flattened, closely ribbed beneath with many (± 17) nerves. Inflorescence narrowly oblong, ± 2–3 cm long, ± 1 cm wide; axis pubescent; pedicels mostly in groups of 3–5, ± 0·2–0·3 mm long, the tips very little oblique. Spikelets ± 5–7 mm long, 1·5 mm wide, the longer hairs of the basal beard 2·2–7 mm long. Lower glume shorter than to somewhat exceeding the upper glume, narrowly ovate, subulate-acuminate with a scabrous awnlet 1·5–3 mm long and with broadly hyaline margins in the lower part, 5-nerved with each lateral pair fused to form a stout rib on the back and with the midrib gradually converging to meet in the awnlet, ciliate on the keels in the upper part with hairs up to 1·5 mm long from small tubercles, pubescent over all the back and also inside in the upper part. Upper glume more abruptly subulate-acuminate with the scabrid awnlet 1·5–1·8 mm long, 9 (or 7)-nerved, nerves ± confluent at base, pilose on the back and pubescent inside in the upper part, the dorsal beard with hairs up to 2–2·2 mm long. Lower floret ± 4·5–5 mm long, acute, slightly gibbous in the lower third, pilose-pubescent; lemma resembling the glumes in texture, stoutly 7-nerved, the nerves stouter below with thinly membranous internerves, shortly pubescent and also pilose on the internerves, pubescent inside in upper part; palea ± 1·2–1·5 mm long, bifid or lacerate, hyaline above, firmer and with inflexed flaps below. Upper floret almost as long, 1 mm wide, acute. Lemma as long as floret, embracing the palea for the greater part, firmly membranous to very thinly cartilaginous with hyaline flat margins narrow and glabrous below broader and ciliate upwards, somewhat narrowly ovate and acute when flattened, firmly 3–5-nerved, the mid-nerve percurrent, 2 others nearly so, the other pair shorter if present. Palea about as long or up to 0·4 mm shorter, similar in texture, 2-nerved throughout, much incurved below and embracing the flower, margins narrowly hyaline below, broadly hyaline and ciliate upwards, somewhat narrowly ovate when flattened and acutate to the very narrow emarginate tip. Lodicules ± 0·6 mm long, 0·4 mm wide. Ovary with rudiment of third sytle. Figs. 2D, 3D, 8.

QUEENSLAND.—Mitchell District: Lisgool Stn. 65 miles ENE. of Blackall, Feb. 1940, *Everist* 1982; Enniskillen Stn., Nov. 1943, *White* 12746.

Neurachne queenslandica resembles *N. munroi* in appearance except for its longer leaves, but the lower glume (unflattened) is prominently aristulate and evenly curved to the base in outline without the oblong constriction of *N. munroi* which gives a different appearance to the spikelet, the lemmas of both florets are firmer in texture, the upper one being as long or longer than the palea conspicuously 3–5-nerved, and the upper palea is not auriculate at the base.

Both collections are from sandstone and/or quartzite hills.

Neurachne tenuifolia S. T. Blake; species nova ob culmorum nodos glabros, folia longa tenuissima convoluto-teretia, glumas dorso glabras valde distincta. Typus: Australia Centrali, Standley Chasm, *Perry* 5387 (holotypus BRI.019001; isotypi, CANB, NSW, PERTH).

Gramen perenne caespites magnos ramosissimos hystricinos efformans. Culmi floriferi erecti, ± 30–50 cm alti, 3–5-nodi, etiam nodis glabri. Foliorum vaginae ore marginibusque ciliatae interdum internerviis primo pilosae ceterum glabrae laevesque; collum glabrum; ligulae pili ± 0·4–0·6 mm longi; laminae ± flexuosae inferiores recurvae superiores ± oblique erecti, plerumque arcte convoluto-teretes, rigidae, pungentes, supra breviter villosae vel pubescentes vel scaberulae, subtus apicem versus atque marginibus scaberulae, alibi laeves glabrae, ± 10–30 cm longae, 0·4–0·8 mm crassae vel explanatae usque ad 2 mm latae, subtus crebre 11–15-costatae. Inflorescentia ambitu oblonga, 4–6 cm longa, ± 1–1·5 cm lata, squarrosa nec conspicue pilosa; axis angulata, scabra; pedicelli 0·4–0·5 mm longi, apice vix dilatato minime obliquo excavati, saepius 2–5-nim aggregati. Spiculae anguste ovatae, acuminatae, 7–11 mm longae, 1·1–1·6 mm latae, basi pilis usque ad 1·2–2·7 mm longis barbatae. Gluma inferior saepissime spicula aequilonga superiore longior raro usque ad 0·9 mm brevior, longe subulato-acuminata aristula 2–3·5 mm longa, prope basem leviter constricta, 5-nervis nervis aequidistantibus dorso supra eos valde incrassata indurataque ita ut dorsum robuste lateque 3-costatum inter costis anguste sulcatum videatur, dorso omnino scaberula, carinis sursum breviter irregulariter ciliolata, marginibus hyalinis sursum angustis ciliolatis, inferne latis glabris, internerviis inferne ± puberula. Gluma superior longe subulato-acuminata aristula 1·3–2 mm longa, crebre conspicue 9–11-nervis, vel sub–7-nervis, in majore parte scaberula, internerviis inferioribus indurata parce laxeque pilosa, barbae pilis interdum brevibus usque ad 0·7 mm longis et irregularibus vel longioribus densioribusque, marginibus anguste hyalinis ciliolata basi excepta, prope basem quoque intra partem superiorem pubescens. Anthoecium inferum anguste ovatum, acutum, inferne admodum gibbosum, 5·5–6·1 mm longum, ± 1–1·4 mm latum, interdum basem aristulae glumae inferioris superans; lemma conspicue 7-nerve basi glabrum alibi brevissime hirtellum, marginibus superioribus ciliatum, sursum rigide membranaceum inferne praecipue super nervis induratum; palea triangularis, acuta vel lacerata, sursum hyalina, inferne admodum incrassata marginibus incurva, ± $\frac{1}{4}$–$\frac{1}{3}$ lemmatis adaequans. Anthoecium superum inferiore 0·2–0·45 mm brevius vel id brevissime superans, 4–6 mm longum, ± 1 mm latum. Lemma paleam pro majore parte vel omnino amplectens, firme membranaceum marginibus anguste hyalinum planum sursum ciliatum, 5-nerve nervo mediano percurrente. Palea paullo brevior, quoad textura similis, 2-nervis, inferne marginibus incurva haud auriculata sursum inflexa. Lodiculae ± 0·5–0·7 mm longae. Antherae 2·5–3·5 mm longae. Styli cum tertii rudimento. Figg. 2E, 3E, 8.

Forms large tussocks; culms much branched above base, the flowering culms 3–5-noded, ± 30–50 cm high, striate, glabrous; nodes glabrous. Leaves: sheaths striate and with ciliate margins and orifice and sometimes pilose on the internerves when young otherwise smooth and glabrous; collar glabrous; hairs of ligule ± 0·4–0·6 mm long; blades ± flexuous otherwise erect or obliquely erect or the lower recurved, mostly tightly convolute and apparently terete, rigid and pungent, villous-pubescent to scaberulous on upper surface, scaberulous on margins and upper part beneath, elsewhere smooth, glabrous, ± 10–30 cm long, 0·4–0·8 mm wide or up to 2 mm when flattened, closely 11–15-ribbed beneath. Inflorescence oblong in outline, 4–6 cm long, ± 1–1·5 cm wide, squarrose, not conspicuously hairy; axis scabrous; pedicels 0·4–0·5 mm long, slightly widened upwards, tips straight, very slightly expanded, most of them in groups of up to 5. Spikelets setaceously acuminate, 7–11 mm long, 1·1–1·6 mm wide; basal beard with hairs up to 1·2–2·7 mm long. Lower glume commonly as long as the spikelet distinctly overtopping the upper one or shorter by up to 0·9 mm, long subulate-acuminate, the awnlet 2–3·5 mm long, a

little constricted shortly above the base, 5-nerved with the nerves equally spaced but the back above them very much thickened and hardened so that the back appears stoutly and broadly 3-ribbed and narrowly furrowed between, back scaberulous all over, the keels shortly and irregularly ciliate in the upper part, the hyaline margins narrow and ciliolate upwards, broad and glabrous downwards, ± puberulous on internerves in lower part. Upper glume long subulate-acuminate, the awnlet 1·3–2 mm long, 9–11-nerved, the nerves close together, very prominent except for the short outermost pair, scaberulous for the greater part, the internerves indurated below and there with a few short weak hairs, hairs of the beard short (up to 0·7 mm long) or long (up to 1–2 mm long) sometimes few or irregular, margins narrowly hyaline, ciliolate except at base, pubescent near this and on the inside of back in upper part. Lower floret narrowly ovate acute, slightly gibbous below, 5·5–6·1 mm long, ± 1–1·4 mm wide, sometimes exceeding the base of the awnlet of the lower glume; lemma prominently 7-nerved, glabrous at base, elsewhere very shortly hirtellous, margins ciliate above, rigidly membranous above ± hardened below especially on the nerves; palea triangular, acute or lacerate, hyaline above, somewhat hardened below with incurved flaps, about $\frac{1}{4}$–$\frac{1}{3}$ as long as the lemma. Upper floret shorter than the lower by 0·2–0·45 mm to slightly exceeding it, 4–6 mm long, ± 1 mm wide. Lemma embracing the palea from above the middle or throughout, firmly membranous, with narrowly hyaline flat margins ciliate upwards, 5-nerved, mid-nerve percurrent, the lateral ones not quite so. Palea a little shorter, similar in texture, 2-nerved, margins incurved but not auriculate below, inflexed above. Lodicules ± 0·5–0·7 mm long. Anthers 2·5–3·5 mm long. Rudiment of third style present. Figs. 2E, 3E, 8.

NORTHERN TERRITORY.—Alice Springs District: Summit of Mt. Liebig, ± 1200 m, July 1966, *Willis*; Mt. Sonder, ± 1200 m, July 1966, *Willis*; Ellery Gorge, Dec. 1970, *Latz* 1044; Serpentine Gorge, July 1970, *Parker* 222; Standley Chasm, on rocky slopes of gorge, Sept. 1955, *Perry* 5387; Standley Chasm, lower reaches of large valley, Oct. 1957, *Forde* 944; 1 mile SW. of Jay Creek Settlement, Dec. 1970, *Latz* 1021.

N. tenuifolia differs from the other species by its tussocky *Triodia*-like habit, its long fine, convolute–terete leaves, glabrous nodes and glabrous backs of both glumes. It has usually been found on steep rocky slopes or rock ledges.

PARANEURACHNE

Paraneurachne S. T. Blake; genus novum affine *Neurachnae* R. Br. a qua glumis valde dissimilibus quarum superiore inferne valde convexa indurata laevi nervis inconspicuis atque anthoecio superiore conspicue acuminato ejus lemmate paleaque induratis rugulosis praecipue differt.—Typus: *P. muelleri* (Hack.) S. T. Blake (*Neurachne muelleri* Hack.).

Spiculae dorsaliter compressae ± plano-convexae, a dorso visae anguste ovatae acuminatae exaristatae, abaxiales, brevissime pedicellatae demum totae a pedicellis persistentibus disarticulantes, solitariae, undique imbricatae in rhachi racemi solitarii terminalis spiraliter dispositae, basi longe barbatae; rhachilla brevissima haud producta. Anthoecia duo, dissimilia; inferum masculum (vel sterile); superum hermaphroditum, infero brevius. Glumae subaequilongae, dissimiles, anthoecia superantes, anguste ovatae, subulato-acuminatae, ± divergentes, marginibus sursum abrupte inflexae inde bicarinatae; inferior rigide membranacea, inferne marginibus late scariosis glumam alteram amplectantibus valde dilatata, dorso fere plana 5–7-nervis nervis conspicuis inaeque distantibus sursum carinis setoso-ciliata; superior in majore parte valde indurata laevis nitidula intus tenuiter 11–13-nervis dorso convexa prope utrumque marginem serie densa pilorum longorum praedita, sursum planiuscula tenuior conspicue 5–3-nervis bicarinata. Anthoecium inferum anguste ovatum acutum basin versus gibbosum sursum excurvum; lemma quoad textura glumae superiori simile valide 7-nerve, marginibus inferioribus anguste hyalinum glabrum marginibus superioribus late hyalinis inflexis ciliatum; palea brevis conspicue 2-carinata. Anthoecium superum infero paulo brevius a dorso visum ovatum acuminatum inferne plano-convexum sursum planiusculum; lemma pro majore parte induratum cartilagineum ± punctato-rugulosum inconspicue 5–7-nerve, sursum ± membranaceum conspicue 5–3-nerve nervis 3 fere percurrentibus, marginibus inferne angustis glabris superne latis ciliatis hyalinum planum; palea lemmati similis sed dorso plana, apice libera alibi a lemmate amplexa, 2-nervis sursum 2-carinata flexuris sub apicem evanescentibus. Lodiculae 2, late cuneatae sinuato-truncatae sursum incrassatae tenuiter nervosae. Stamina 3; antherae anguste oblongae, glabrae, muticae. Styli 2, basi abrupte dilatati connatique alibi tenues, liberi; stigmata undique plumosa, purpurea, lateraliter exserta. Caryopsis obovato-oblonga valde compressa, basibus connatis stylorum coronata, anthoecio multo brevior; scutellum circiter dimidiam partem caryopseos aequans; hilum basale, punctiforme.—Gramen perenne stolones saepissime proferens; culmi caespitosi, graciles, paucinodes, ± ramosi; innovationes plerumque intravaginales; foliorum laminae ovato-lineares, basi parum angustatae, vaginis angustiores, crebre nervosae costa haud conspicua, vernatione convolutae; ligula ad zonam pilorum densorum redacta; inflorescentia brevis, late spiciformis, pilosa, ob glumas divergentes squarrosa; spiculae pro ratione paucae, magnae, similes vel infima paulo redacta.

Species adhuc nota unica variabilis Australiae partis septentrionalis aridae et subaridae incola. (Fig. 9).

Spikelets dorsally compressed, ± planoconvex, in dorsal view narrowly ovate acuminate, awnless, abaxial, very shortly pedicellate at length falling entire from the persistent pedicels, solitary and spirally imbricate in solitary terminal racemes, long bearded at the base; rhachilla very short, not produced. Florets 2, dissimilar, the lower male or sterile, the upper hermaphrodite shorter than the lower. Glumes subequal in length otherwise dissimilar, overtopping the florets, narrowly ovate, subulate-acuminate, ± diverging, 2-keeled in the upper part where the margins are suddenly inflexed; lower glume rigidly membranous, the margins in the lower part much dilated, broadly scarious and embracing the upper glume, nearly flat on the back, 5–7-nerved, the nerves conspicuous, unequally spaced, the keels of the upper part setose-ciliate with tubercle-based stiff hairs. Upper glume very much indurated

for the greater part, smooth and shining, finely 11–13-nerved on the inside, convex on the back with a dense series of long hairs near each margin, the upper part thinner, nearly flat, conspicuously 5–3-nerved and 2-keeled. Lower floret narrowly ovate, acute, gibbous towards the base, excurved upwards; lemma similar to the upper glume in texture, stoutly 7-nerved, the margins narrowly hyaline and glabrous below, broadly hyaline, inflexed and ciliate above; palea short, conspicuously 2-keeled. Upper floret a little shorter than the lower floret, in dorsal view narrowly ovate acuminate, plano-convex in the lower part, nearly flat above; lemma for the most part indurated, cartilagineous, ± punctate-rugulose, inconspicuously 5–7-nerved, the upper part ± membranous, conspicuously 5–3-nerved with 3 nerves nearly percurrent, the margins flat and hyaline, narrow and glabrous below broad and ciliate above; palea resembling the lemma but flat on the back, embraced by the lemma except at the free tip, 2-nerved, 2-keeled in the upper part with flaps disappearing beneath the tip. Lodicules 2, broadly cuneate, sinuate-truncate, thickened in the upper part, finely nerved. Stamens 3; anthers narrowly oblong, glabrous, muticous. Styles 2, abruptly dilated and connate at the base, elsewhere slender, free; stigmas plumose all round, purple, laterally exserted. Grain obovate-oblong, much compressed, crowned by the united bases of the styles, much shorter than the floret; scutellum about half as long; hilum basal, punctiform. — A perennial often stoloniferous grass with tufted, slender, few-noded, ± branched culms; innovations mostly intravaginal; leaf-blades ovate-linear, little narrowed at the base, narrower than the sheaths, closely nerved with the midrib hardly different from the other veins, convolute in bud; ligule reduced to a zone of dense hairs; inflorescence short, broadly spiciform, hairy, squarrose from the divergent glumes; spikelets relatively few, large, all similar or the bottom one slightly reduced.

One variable species from the arid and semi-arid parts of northern Australia. (Fig. 9).

Paraneurachne muelleri (Hack.) S. T. Blake, comb. nov. Based on *Neurachne muelleri*.

Neurachne muelleri Hack. Oesterr. Bot. Zeitschr. 45: 329 (1895); Lazarides, The Grasses of Central Australia 179, 261 (1970). Type: Western Australia, Fortescue R., comm. *F. Mueller* in 1895 (holotype, W, photo BRI, K; isotype, MEL).

Neurachne clementii Domin, J. Linn. Soc. Bot. 41: 273, t. 10, figs. 1–6 (1912), Biblioth. Bot. 85: 284 (1915); C.A. Gardn. Fl. W. Aust. 1 (1): 273, t. 78, figs. C–D (1952). Type: Western Australia, between Ashburton and Yule Rivers, *Clement* (K).

Green to somewhat glaucous tufted perennial with few pubescent cataphylls and intravaginal innovations. Culms slender 0·7–1·2 mm thick, dimorphic, some erect, up to 45 cm high, 3–5-noded above the base, simple or branched from 1 or more of the nodes except the uppermost, the branches often fasciculate and sometimes rebranched, other culms stoloniform up to 1 m long, up to 10-noded with arcuate internodes, rooting at the nodes or not and there with tufts of 1–3-noded flowering branches; all nodes densely pubescent; internodes striate otherwise terete, glabrous, smooth or minutely and sparsely papillose, the topmost (peduncle) well exserted, glabrous, 0·4–0·6 mm wide. Leaf-sheaths much shorter than the internodes, convolute, rounded on the back, persistent, striate, with or without a few long tubercle-based hairs, the lower ones pubescent, the upper ones glabrescent upwards or glabrous but all ± ciliate at least on the upper part of the overlapping margin and with a few long hairs at the mouth, smooth except for the tubercles; collar pubescent; ligule of hairs 0·5–0·8 mm long; blades not disarticulating, linear or ovate-linear, scarcely at all narrowed to the base, flat and not very rigid or ± inrolled, about 1–12 cm long and 2–4 mm wide, with 4–5 pairs of major veins besides the scarcely prominent midrib with 1–3 finer veins between neighbouring major veins, the nerve-like margins scaberulous, pubescent on both sides or glabrescent on the lower, and with scattered long tubercle-based hairs, the hairs themselves at length tending to wear away. Inflorescence about oblong-cylindrical, dense, hairy and squarrose, 2·7–3·5 cm long 1·5–2·5 cm wide; axis flexuous, scabrous or somewhat pubescent to shortly and sparsely pilose in upper part; pedicels scabrous, somewhat cuneate-clavate with an oblique slightly expanded and excavated tip, 0·25–0·7 mm long. Spikelets pale or tinged with purple, 7·4–12 mm long including the awnlets, 1·6–2·5 mm wide excluding the hairs, the longer basal hairs 3–5 mm long. Lower glume as long as the spikelet or shorter by up to 2·2 mm, its awnlet 1–1·5 mm, the lateral nerves approximated, ± confluent near base and in the upper part, the outermost pair short, the keels rigidly ciliate in the upper part with tubercle-based hairs up to 0·4–1·0 mm long. Upper glume reaching to the top of the spikelet, its awnlet 0·35–2·5 mm long, the outer 2–3 pairs of veins closely approximated and confluent above and below, shortly pubescent on the back near the base, elsewhere glabrous except for the submarginal beards of hairs up to 4–4·5 mm long. Lower floret 5·5–7·5 mm long, nearly free from the upper floret; lemma closely puberulous over most of the back; palea 1·5–2·5 mm long, about $\frac{1}{5}$–$\frac{1}{3}$ as long as the lemma, acutely acuminate or lacerate. Upper floret 5·5–7 mm long, 1·4–1·8 mm wide, stramineous; lemma with the lateral nerves disappearing well below the tip, the innermost pair of nerves abruptly incurved to meet the midvein in upper part with an occasional cross-vein below; palea from a little shorter (by 0·2 mm) to a little longer (by 0·25 mm) the nerves very closely converging upwards and becoming marginal below the tip. Anthers 3·5–4·35 mm long. Grain 2·1–3·25 mm long, 1·1–1·8 mm wide. Figs. 4, 9.

WESTERN AUSTRALIA.—Northern Province: Peeawah Creek, Feb. 1962, *George* 3400; Mundabullangana Stn., Feb. 1962, *George* 3455; Warralong Stn. near Coongan R., May 1941, *Burbidge* 717 and Feb. 1938, *Melville*; Karratha Stn. [near Roebourne], Oct. 1941, *Gardner* 6262; between Ashburton and Yule Rivers, *Clement*; Fortescue R., in 1895, ? no. 39, comm. *F. Mueller*; 10 miles E. of Millstream Stn., Mar. 1962, *George* 3547; Abydos Stn., Apr. 1954, *Stewart;* Hamersley Range, Aug. 1932, *Gardner s.n.,;* Tambrey Stn., Hamersley Range, Aug. 1932, *Gardner* 3112. Eremean Province: Austin District: Manberry Stn. near Minilya R., July 1937, *Meadley* 41; 5 miles S. of Stag Arrow Ck., Rabbit-Proof Fence, May 1947, *Royce* 1698; 2 miles E. of Jigalong, May 1947, *Royce* 1544; 73 miles S. of Mundiwindi, Mar. 1962, *George* 3634; 12 miles NE. of Millrose Stn. [ENE. of Wiluna], Sept. 1958, *Speck* 1386; 68 miles SW. of Warburton Mission, Sept. 1966, *George* 8161; 14 miles S. of W. end of Hopkins Lake, Aug. 1962, *Symon* 2375; between Blackstone and Cavanagh Ranges, July 1963, *George* 5265.

NORTHERN TERRITORY.—Victoria River District: 30 miles S. of Elliott, Stuart Highway, Feb. 1969, *Must* 469 (NT.15733); 30 miles SSW. of Wave Hill Stn., June 1949, *Perry* 2215; 27 miles S. of Wave Hill Stn., July 1956, *Chippendale* NT.2190; 19° 27′ S., [132° 35′ E.], July 1911, *Hill* 431. Barkly Tableland District: 5 miles S. of Banka Banka, Mar. 1955, *Winkworth* 1010; Mt. Isa turn-off, Stuart Highway, July 1965, *Beauglehole* 10707; 7 miles N. of Tennant Creek, Apr. 1948, *Perry* 584; Tennant Creek, June 1946, *Blake* 16011; 7 miles S. of Tennant Creek, Mar. 1955, *Chippendale* NT. 960; near (SSE. of) Anthony Lagoon homestead, 244 m, May 1947, *Blake* 17803; Rockhampton Downs Stn., 19° 02′ S., 135° 09′ E., 227 m, May 1947, *Blake* 17869; 4 miles ESE. of Frewena Stn., Apr. 1948, *Perry* 666; 7 miles NW. of Alexandria homestead, June 1960, *Chippendale* NT.7156; 10 miles S. of Alexandria Stn., June 1948, *Perry* 1559; 58 miles W. of Gallipoli Stn., June 1948, *Perry* 1537; ca. 100 miles E. of Tennant Creek on Barkly Highway, Apr. 1968, *Vickery* NSW 85498; 2·4 miles WNW. of Wonarah Telegraph Office, June 1960, *Chippendale* NT.7320; W. to SW. of Soudan Stn., June 1946, *Blake* 15972; 110 miles WSW. of Lake Nash Stn., May 1948, *Perry* 898. Alice Springs District: 27 miles W. of The Granites, July 1948, *Banks* NT.858; between Mt. Davidson and Refuge Basin, May 1970, *Parker* 206; 15 miles WSW. of Murray Downs Stn., May 1957, *Lazarides* 6261; 20 miles N. of Barrow Creek Hotel, Mar. 1955, *Chippendale* NT.917; 10 miles N. of Barrow Creek, Apr. 1970, *Parker* 156 (NT.27158); Central Mt. Stuart, July 1968, *Weber* 1013; Stuart Highway 148 miles N. of Alice Springs, July 1968, *Must* 153 (NT.15005); Native Gap, 71 miles N. of Alice Springs, Jan. 1969, *Nelson* 1835 (NT.15520); Hann Range, Aug. 1969, *Nelson* 369 (NT. 9428); 8 miles NE. of MacDonald Downs Stn., Mar. 1953, *Perry* 3408; 3 miles SW. of MacDonald Downs Stn., Mar. 1953, *Perry* 3335; 62 miles NNW. of Alice Springs, June 1958, *Winkworth* 1467; Stuart Highway 62 miles N. of Alice Springs, Oct. 1968, *Nelson* 1773 (NT.15354), Feb. 1968, *Nelson* 1622, and 50 miles N. of Alice Springs, Apr. 1969, *Nelson* 1882 (NT.16192); Amburla Stn., Mar. 1967, *Nicholls* 504; 44 miles ENE. of Harts Range Police Depot, May 1955, *Lazarides* 5211; Old Huckitta homestead, July 1970, *Latz* 657; 2 miles NE. of Huckitta homestead, Jan. 1971, *Latz* 1116; ± 6 miles SW. of Glen Edith, June 1959, *Chippendale* NT.6266; Hamilton Downs Stn., Sept. 1955, *Chippendale* NT. 1677; Finke R., in 1891, *Kempe* 9; Mt. Gillen, ± 900 m, July 1966, *Willis*; Heavitree Range 1 mile E. of Heavitree Gap, Jan. 1971, *Latz* 1049; 44 miles S. of Glen Helen homestead, Apr. 1962, *Perry* NT.8673; Ilpilla Gorge, in 1894, *Tate*; 65 miles W. of Henbury homestead, King's Canyon Road, Dec. 1968, *Latz* 259 (NT.15790); Docker River, Petermann Ranges, Aug. 1966, *Carolin* 5314; 12 miles E. of Docker River Settlement, Nov. 1970, *Latz* 971; 54 miles E. of Docker River Settlement, Oct. 1970, *Latz* 845; Mt. Olga, June 1926, *Basedow* 99 of Mackay Exploring Expedn.; 17 miles NW. of Andado homestead, Aug. 1968, *Must* 323.

QUEENSLAND.—Burke District: 15 miles N. of Morstone Stn., May 1948, *Perry* 987; Cloncurry, ± 210 m, Nov. 1935, *Blake* 10135. Gregory North District: Juenburra near Duchess, 348 m, Nov. 1935, *Blake* 10203; 24 miles E. of Urandangie, May 1948, *Perry* 828; 51 miles SE. of Dajarra, Mar. 1954, *Lazarides* 4340; Colane Stn., [WSW. of] Winton, July 1930, *Pollock*; Tranby Stn., 22° 40′ S., 142° 25′ E., 165–210 m, May 1936, *Blake* 11401. Gregory South District: Currawilla Stn., about 100 miles W. of Windorah, June 1949, *Everist* 3908; 10 miles W. of Windorah, June 1967, *Gittins* 1251; 20 miles SE. of Windorah, Sept. 1966, *Boyland* 146; Mt. Howitt Stn., 80 miles W. of Eromanga, July 1936, *Blake* 11945; Thylungra Stn., about 75 miles NW. of Quilpie, Oct. 1955, *Everist* 5708. Mitchell District: Prairie, ± 435 m, May 1936, *Blake* 11573; 16 miles NW. of Longreach, July 1952, *D. Davidson* 250; Frazerburgh Stn., [SE. of] Jundah, in 1938, *Bowman*; Barcaldine, Apr. 1919, *White*; 51 miles N. of Blackall on road to Barcaldine, May 1968, *Webb & Tracey* 8289; Rocklea Stn., Lochnagar, Nov. 1930, *Sutherland* 12; near Lochnagar, ± 330 m, Nov. 1935, *Blake* 10312.

SOUTH AUSTRALIA.—Far North West: near Mt. Watson, July 1891, *Helms.*

P. muelleri has been usually found on sandy plains or stony slopes or ridges, frequently associated with *Triodia* spp. occasionally in mulga scrub (*Acacia aneura*) and, in the most easterly localities, in Eucalyptus " woodland " or " open forest ". Most collectors have remarked on its stoloniferous habit, a rare character in Australian grasses that helps to make this species so conspicuous where it grows.

The name *Neurachne muelleri* has been commonly overlooked, and the type material is scanty with relatively small spikelets described by Hackel as 8–9 mm long. The type of *N. clementii* has unusually long leaves and spikelets 11–12 mm long representing the other extreme in length of spikelet. The species is variable in indumentum including that of the axis, and size and shape of the spikelets, but some of the variation here is the result of the variability in length of the awnlet of the upper glume.

THYRIDOLEPIS

Thyridolepis S. T. Blake; genus novum, affinis *Neurachnae* R.Br. et *Paraneurachnae* S. T. Blake ab hac anthoecio infero superum amplectanti supero nec ruguloso ab illa lemmate superiore cum palea conspicue indurata ab ambobus glumis inter se distantibus apice ± obtusis ± 3-denticulatis inferiore profunde longitudinaliter excavata hyalino-fenestrata anthoecio supero ± rostrato inferum superante foliorum laminis basi abrupte contractis vel breviter pseudopetiolatis differt.—Typus: *T. mitchelliana* (Nees) S. T. Blake (*Neurachne mitchelliana* Nees).

Spiculae dorsaliter compressae planoconvexae a dorso visae anguste ovatae ± rostrato acuminatae muticae, abaxiales, brevissime pedicellatae demum totae a pedicellis persistentibus disarticulantes, solitariae, undique imbricatae in rhachi racemi solitarii terminalis spiraliter dispositae, basi longe barbatae; rhachilla inter glumas paulo elongata supra eas brevissima, ultra anthoecium superum haud producta. Anthoecia duo, dissimilia; inferum masculinum vel sterile, superum hermaphroditum. Glumae subaequilongae dissimiles, anthoecia vel aequantes vel superantes vel inferior eis paulisper brevior, coriaceae, 7–11-nerves, praecipue sursum ± 2-carinatae ibique saepius ± rostratae apice angusto ± 3-denticulatae vel integrae, infra rostrum vel partem superiorem e seriebus tuberculorum confluentium setosae, explanatae ± ovatae; inferior marginibus basi circum rhachillam connatis vel ad ejus dorsum adnatis, dorso plana sed sub rostro usque ad basin longitudinaliter excavata hyalino-fenestrata et supra fenestram callo transversali setas gerente praedita; superior ± acuminata vel rostrata marginibus liberis anthoecia partim amplectens, dorso sub rostro convexa valde indurata, prope utrumque marginem serie tuberculorum magnorum partim confluentium setos vel quoque pilos longos ferentium praedita, seriebus subtus rostrum sese approximantibus vel arcuatim confluentibus. Anthoecium inferum angustius ovatum acuminatum dorso planum, infra acumen ellipticum vel admodum ovatum; lemma cartilagineum, 5-nerve, lateribus inferne late incurvis anthoecium superum amplectens, acumine marginibus inflexis bicarinatum, apice ± 3-denticulatum; palea dimidium lemma aequans vel brevior vel nulla; lodiculae saepe nullae. Anthoecium superum infero paulo longius ambitu angustius ovatum, ± rostrato-acuminatum, sub acumine ± incurvo ellipticum vel admodum ovato-ellipticum inaeque biconvexum sed valde compressum; lemma in majore parte tenuiter cartilagineum vel tenuiter crustaceum, tenuissime striolatum, extus glaberrimum, tenuiter 3- vel sub-5-nerve, lateribus incurvum, marginibus planis angustissime hyalinum, rostro vel acumine ± herbaceum marginibus inflexis 3-nerve nervis validis approximatis percurrentibus, apice ± 3-denticulatum; palea quoad forma texturaque lemmati similis, 2-nervis inter nervos fere plana lateribus inferne incurva, acumine angustissimo nervis fere marginata hic a lemmate interdum haud amplexa. Lodiculae 2 cuneatae tenues obscure nervosae vel 0. Stamina 3; antherae glabrae. Styli 2, longi. distincti, tenues; stigmata plumosa ex apice anthoecii exserta vel inclusa. Caryopsis inter lemma paleamque arcte inclusa, ± elliptica, dorso valde compressa marginibus rotundata; scutellum late ellipticum, $\frac{2}{3}$–$\frac{3}{4}$ caryopseos aequans et ejus latitudinem fere aequans; hilum subellipticum basale circa $\frac{1}{5}$–$\frac{1}{6}$ caryopseos aequans. —Gramina perennia caespitosa foliosa cataphyllis crispo-lanatis praedita; innovationes extravaginales; culmi plurinodes erecti vel pauci interdum breviter decumbentes fere stoloniformes; foliorum laminae vernatione convolutae, mox planae aetate persistentes, anguste ovatae vel ovato-lineares, basi abrupte contractae vel in pseudopetiolum brevem abrupte constrictae, crebre nervosae nervis circa 5 validioribus quorum costa quam ceteris vix robustiore; ligula ad zonam pilorum densorum redacta; inflorescentia longe exserta angustius spiciformis setosa vel quoque pilosa; spiculae quoad magnitudo inter mediocres quoad indumentum inter se variabiles, infimae perpaucae ± redactae ± distantes; pedicelli apice dilatato excavati. Species 3, Australiae subaridos vel aridos plerumque extratropicos incolae (Fig. 10).

Spikelets dorsally compressed, planoconvex, in dorsal view narrowly ovate, ± abruptly long acuminate, awnless, abaxial, very shortly pedicellate, at length falling entire from the persistent pedicels, solitary and spirally imbricate in solitary terminal racemes, long-bearded at the base; rhachilla somewhat elongated between the glumes, very short above them, not produced beyond the florets. Florets 2, dissimilar; lower male or sterile, the upper hermaphrodite. Glumes subequal in length otherwise dissimilar, equalling or overtopping the florets or the lower a little shorter, coriaceous, 7–11-nerved, ± 2-keeled especially in the upper part, acutate to rostrate with a narrow ± 3-denticulate or entire tip, setose below the upper part from a series of confluent tubercles, ± ovate when flattened out; lower glume with the margins connate at the base around the rhachilla, or adnate to the back of the rhachilla, flat on the back but with a thickened transverse ridge below the beak bearing a series of bristles and below this a longitudinal hyaline window-like excavation extending to the base; upper glume ± acuminate to rostrate with free margins partly embracing the florets, the back convex and much indurated below the beak with a series of large partly confluent tubercles near each margin bearing bristles or also long hairs, the two series approaching one another or uniting in an arc beneath the beak. Lower floret narrowly ovate, acuminate, flat on the back, elliptic or somewhat ovate below the acumen; lemma cartilaginous, 5-nerved, the sides broadly incurved below embracing the upper floret, the acumen 2-keeled with inflexed margins, the tip ± 3-denticulate or retuse; palea up to half as long as the lemma; lodicules often 0. Upper floret a little longer than the lower floret, narrowly ovate, ± rostrate-acuminate, elliptic or somewhat ovate beneath the ± incurved acumen, unequally biconvex but much compressed; lemma for the most part thinly cartilaginous or thinly crustaceous, very finely striolate, quite smooth, glabrous, finely 3- or sub-5-nerved, the sides incurved with flat very narrowly hyaline margins, the acumen ± herbaceous with inflexed margins and 3 stout approximate percurrent nerves, the tip ± 3-denticulate and minutely papillose to very shortly pubescent inside; palea resembling the lemma in form and texture, 2-nerved, nearly flat between the nerves, the sides incurved below, the acumen very narrow almost marginate on the nerves truncate or emarginate at the tip and not always embraced by the lemma. Lodicules 2, cuneate, thin, obscurely nerved, or 0. Stamens 3; anthers glabrous. Styles 2, long, distinct, slender; stigmas plumose, exserted from the top of the floret or included. Grain tightly embraced by the lemma and palea, ± elliptic, strongly dorsally compressed with rounded margins; scutellum broadly elliptic, $\frac{2}{3}$–$\frac{3}{4}$ as long as the grain and nearly as wide; hilum subelliptic, basal, about $\frac{1}{5}$–$\frac{1}{6}$ as long as the grain.—Perennial tufted leafy grasses with crinkly-woolly cataphylls and extravaginal innovations; culms mostly several-noded (sometimes few-noded), simple or branched, erect or sometimes a few in the tuft shortly decumbent, these rooting at one or more nodes and almost stoloniform; internodes, at least the lower ones, silky pubescent; nodes pubescent or the upper ones ± glabrous; leaves with scattered long rigid tubercle-based hairs and also ± pubescent; sheaths tightly convolute, rounded on the back, ciliate on at least the overlapping margin and the orifice; ligule reduced to a zone of dense hairs; collar puberulous or pubescent; blades convolute in bud, soon flat, persisting when old, narrowly ovate to ovate-linear, acute, abruptly rounded at the base sometimes with a short pseudopetiole, closely nerved with about 5 nerves stouter than the others but the midnerve not especially prominent and with nerve-like margins scaberulous at least towards the tip; inflorescence long exserted, narrowly spiciform, bristly or also hairy; axis angular, flexuous, villous-pubescent; pedicels short, compressed clavate with expanded concave glabrous tips shortly produced on the adaxial side, pubescent towards the base; spikelets of medium size variable in indumentum, a very few of the lower ones ± reduced and ± distant, a few of the uppermost often longer because of the elongated often more distantly separated glumes, the lower of which is sometimes longer than the upper.

Type: *T. mitchelliana* (Nees) S. T. Blake (*Neurachne mitchelliana* Nees).

Species 3 in the semiarid and arid parts of mainland Australia with no definite rainy season chiefly south of the Tropic of Capricorn (Fig. 10) on sandy, loamy or stony soils often associated with mulga (*Acacia aneura*). They grow afresh after rain at any time of the year and are reputed to be very useful fodder grasses.

The generic name is derived from θυρις, θυριδος, a window and λεπις, scale or glume in allusion to the hyaline depressed region of the lower glume.

KEY TO SPECIES OF THYRIDOLEPIS

Spikelets 4·5–6·8 mm long, 1·6–2·1 mm wide, the middle and upper ones pubescent to villous as well as setose with bristles the longer of which are 2–3·5 mm long; nerves in the upper part of both glumes narrower than the internerves; leaves 2·5–4·5 mm wide, at least the lower sheaths longer than the internodes; all nodes ± pubescent; culms silky-pubescent beneath the inflorescence:

> Inflorescence ± 2–3·5 cm long, ± attenuate but scarcely interrupted at base, all the spikelets contiguous or overlapping or one or two lowermost ± distant, ± abruptly rostrate-acuminate, the middle and upper ones with long fine hairs in addition to short fine hairs and long bristles; pedicels 0·7–0·9 mm long; lower glume with 9–29 bristles from the transverse ridge and the hyaline area glabrous. Culms 6–12-noded *T. mitchelliana*
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> Inflorescence 5–9 cm long with the lower spikelets distant from one another by up to 16 mm, the middle and upper ones ± gradually acuminate not rostrate and without long fine hairs; pedicels 1–2·2 mm long; lower glume with 5–10 bristles from the transverse ridge, the hyaline area commonly pubescent. Culms 2–9-noded *T. multiculmis*

Spikelets 4–5 mm long, 1·25–1·5 mm wide, all or nearly all glabrous or nearly so; lower glume with bristles 1·2–3 mm long; nerves in the upper part of both glumes wider than the internerves; leaves 1·4–4 mm wide with sheaths shorter to much shorter than the internodes; upper nodes and internodes ± glabrous; culms glabrous beneath the inflorescence *T. xerophila*

Thyridolepis mitchelliana (Nees) S. T. Blake, comb. nov. Based on *Neurachne mitchelliana*.

Neurachne mitchelliana Nees, Hook. London J. Bot. 2: 410 (1843); F. Muell. Fragm. Phytogr. Aust. 7: 200 (1874); Benth. Ic. Pl. t. 1240 (1877), Fl. Aust. 7: 508 (1878); F. M. Bail. Ill. Monogr. Grasses Qd 1 (1879), Qd Fl. 6: 1846 (1902); Turner, Ag. Gaz. N.S.W. 2: 28, fig. (1891) and Austr. Grasses 33, fig. (1895); Maiden, Man. Grasses N.S.W., 66 (1898); J. M. Black, Handb. Fl. S. Aust. 57 (1922), ed. 2: 66 (1943); Gardner, Fl. W. Aust. 1 (1): 273, 272 fig., (1952); J. W. Vickery, Proc. Linn. Soc. N.S.W. 60: 366, figs. 34–5 (1935), Contr. N.S.W. Nat. Herb. Flora Ser. 19 (1): 73 (1961); J. H. Willis, Handb. Pl. Vict. 1: 194 (1962); Lazarides, The Grasses of Central Australia, 178, 261 (1970). Type: Interior of New Holland [?Lachlan R.], *Mitchell* 46 of 1836 Expedn. (CGE).

Culms in small dense tufts, woolly at the base, erect, ± 20–50 cm high, simple or branched, 5–12-noded, nodes densely pubescent, the lower internodes silky woolly, the upper less densely so, the topmost (peduncle) long exserted, pubescent beneath the inflorescence, ± glabrous below. Leaves: sheaths longer or the upper shorter than the internodes, pubescent to glabrescent especially upwards with both margins ciliate and with scattered to frequent long tubercle-based hairs, the orifice long-bearded; collar densely pubescent; ligule ± 0·5–0·8 mm long; blades with a pseudopetiole 0·5–0·8 mm long, ± 2·5–6·5 cm long, 2·5–4·5 mm wide, bearing on the margins a few to abundant long stiff tubercle-based hairs these extending to the loosely pubescent lower surface, the upper surface with a few minute asperities and densely pubescent at and near the base. Inflorescence ± villous at least in the upper part, narrowly oblong in outline, ± attenuate to base sometimes 1 or 2 spikelets ± distant, ± 20–35 mm long and 7–9 mm wide; pedicels 0·7–0·9 mm long, villous-pubescent, some of them approximated in pairs. Spikelets acuminate or ± rostrate, 4·5–7·5 mm long, 1·7–2 mm wide, ± villous, longer hairs of the basal beard 0·5–1·5 mm long, a few of the lower ones with shorter bristles, less hairy to almost glabrous, more distant and somewhat reduced in size and development. Glumes subequal or the upper overtopping the lower by up to 0·3 mm or overtopped by up to 0·25 mm, the internode between them 0·6–0·7 (—1) mm long. Lower glume up to 0·3 mm shorter than the spikelet or equalling it, narrowly ovate acuminate with the acumen not much narrowed upwards, the carinal nerves 0·6–0·85 mm apart at base, 0·4–0·7 mm apart at tip, the intracarinal nerves narrower than the internerves, ovate-elliptic to almost elliptic when flattened, tip narrowly ± truncate in outline, ± 3-toothed, the lateral teeth mostly shorter and narrower or ± obsolete, sometimes all quite minute or indistinct, very densely pubescent to villous on the back and sides except for the window or only near the base, the extreme margins glabrous below scaberulous upwards, sparsely pubescent inside near the tip; transverse ridge just below to just above the middle (about 2·5–3 mm from the base), ± 0·4–0·7 mm across, 0·3–0·4 mm high with 9–29 bristles 1·35–3·6 mm long, sometimes with a few tubercles on the back with or without a single bristle; window narrowly ovate, the top about as broad as the transverse ridge, 1·8–2·7 mm long and 0·9–1·3 mm wide at the base. Upper glume commonly reaching the top of the spikelet and ± overtopping the lower, narrowly ovate acuminate, ovate acuminate when expanded but too hard to flatten, tip subtruncate to slightly rounded in outline, shortly 3-toothed, the teeth equal or subequal in length, the lateral ones commonly somewhat narrower than the middle one and sometimes a little shorter, more rarely the teeth irregular; acumen (beak) $\frac{2}{5}$ to almost $\frac{1}{2}$ the total length of the glume, narrowly oblong with the sides about parallel, green, plainly nerved but the nerves not as wide as the internerves, loosely pilose on the back, densely so inside for the greater part, margins ciliolate, inflexed or flat; lower part indurated, 11-nerved, the nerves becoming closer together towards the margins and upwards, the external pair disappearing at about the base of the beak, tuberculate with a dense series of transversely widened tubercles almost from the base on 2 outermost pairs of nerves disappearing upwards from the external pair and moving across to meet and fuse into a ridge at the base of the acumen, the tubercles 0·2–0·3 mm high with long obliquely spreading very slender to stout bristle-like hairs or bristles, the longer ones 2–3·5 mm long, also with warts on the back without bristles these sometimes ± confluent to form transverse irregular rounded ridges, the back also pubescent to villous, sometimes quite hidden by the indumentum; proportion of submarginal long slender hairs to bristles variable, the hairs few to none on the lower spikelets and ± obscuring or partly replacing the bristles in the upper part of the inflorescence. Lower floret barren, shorter than the upper glume by 1·2–1·8 mm and shorter than the upper floret by 0·1–0·3 mm, the part below the acumen almost elliptic, slightly convex on the back, the acumen between $\frac{1}{3}$ and $\frac{1}{4}$ as long, ± parallel-sided in the upper part; lemma ± acute in outline, ± 3-toothed by reason of the excurrent veins, the middle or only tooth ± narrowly subtriangular the lateral ones smaller to obsolete, ± 2-keeled especially in the upper part, back transversely verruculose-rugulose sometimes with a few tubercles, pubescent with glabrous sides below, the acumen slightly scaberulous on the nerves, pubescent inside and with scaberulous ciliolate margins; palea ± quadrate or pentagonal, 2-keeled below, emarginate or lacerate, up to 0·4 mm long or absent. Upper floret 3·4–4·5 mm long, 1·2–1·5 mm wide, shorter than the upper glume by 0·9–1·7 mm, pale brown, very finely striolate, scarcely at all shining, not rugulose, biconvex but compressed, elliptic or somewhat ovate-elliptic below the beak which is between $\frac{1}{4}$ and $\frac{1}{3}$ as long as the floret. Lemma acute to ± obtuse in outline, mostly 3-toothed due to excurrent nerves, the middle tooth narrowly triangular, the lateral ones smaller to absent. Palea embraced all along, veins visible keel-like only in the beak and there almost meeting at the very narrow truncate or emarginate tip. Flowers cleistogamous; lodicules ± 0·5 mm long and 0·45 mm wide or absent; anthers elliptic 0·3–0·4 mm long. Grain 1·7–2·2 mm long, 1·05–1·25 mm wide. Figs. 5, 10.

WESTERN AUSTRALIA.—Eremean Province: Austin District: Meekatharra, July 1931, *Gardner;* Von Treuer Tableland, S. of Lake Carnegie, Oct. 1968, *Wilson* 7421; Poison Creek via Leonora, Sept. 1909, *McGregor* NSW 25070; Niagara Dam near Kookynie, Aug. 1962, *George* 4146; Laverton, Sept. 1909, *Maiden* NSW 126552; near Ivor Rocks E. of Laverton, July 1963, *George* 4554; Terhan Rockhole, Warburton Road, July 1963, *George* 4704; Muggan, Warburton road, Aug. 1962, *George* 3780; Giles, June 1958, *Chippendale* NT.4558 and Aug. 1962, *Symon* 2510.

NORTHERN TERRITORY.—Alice Springs District: 36 miles NNW. of Alice Springs, Aug. 1956, *Lazarides* 5767; 31 miles N. of Alice Springs, Apr. 1954, *Winkworth* 180; 15 miles NNW. of Alice Springs, Nov. 1954, *Winkworth* 720; 14 miles NNW. of Alice Springs, May 1955, *Lazarides* 5282; 17 miles N. of Alice Springs, Oct. 1968, *Nelson* 1775 (NT.15356) and Mar. 1969, *Nelson* 1864; on Hamilton Downs Station, Mar. 1953, *Gardner* 11650; ± 40 km from Alice Springs on road to Hamilton Downs Station, July 1968, *Orchard* 697; Angas Downs Stn., June 1935, *Cleland;* 24° 49′ S., 129° 23′ E., Petermann Ranges, Sept. 1970, *Dunlop* 1912; Docker River, Petermann Ranges, Aug. 1966, *Carolin* 5343; 10 miles W. of Mt. Sir Henry, Ayers Range, June 1926, *Basedow* 49 of Mackay Exploring Expedn; E. of Mt. Grundy, May 1926, *Basedow* 21 of Mackay Exploring Expedn.

SOUTH AUSTRALIA.—Far North West: 30–80 miles E. of "Ernabella", Sept. 1945, *Cleland;* near Tuntons Bore, ± 35 km W. of Everard Park Homestead, in Everard Ranges, Sept. 1963, *Whibley*

1153; Moorilyanna Native Well [± 26° 50′ S., 133° 00′ E.], July 1914, *S.A. White*. Far North: Banks of Eateringinna Creek, De Rose Hill Station, in 1954, *Lothian* 786; Upper Arckaringa Valley, May 1891, *Helms*.

QUEENSLAND.—Gregory South District: about 25 miles SSE. of Windorah near Kyabra Creek, Aug. 1963, *Everist* 7456. Warrego District: 26° 50′ S., 144° 19′ E., ± 16 miles S. of Quilpie, Nov. 1970, *Boyland* 905; 16 miles S. of Toompine on road to Thargomindah, Apr. 1962, *Ebersohn* E.301; Oakwood Stn., ± 50 miles N. of Charleville, Oct. 1940, *Smith & Everist* 866 and May 1936, *M. W. White* 3; Maxvale Stn., Dec. 1935, *Everist* 1446; Charleville, ± 300 m, Apr. 1934, *Blake* 5367 and Apr. 1936 *Blake* 11061 and without date, *Tidswell* 7; Tooloon Stn., 21 miles S. of Charleville, Apr. 1957, *Bissett* E.91; Dynevor Downs Stn., Apr. 1941, *White* 11542 and 28° 06′ S., 144° 10′ E., Nov. 1970, *Boyland* 906; Yanna Siding, Apr. (?) 1935, *Hutchinson;* Penaroo Stn., near Eulo, *F. J. Young* 60; Tarko Stn., ± 35 miles SW. of Eulo, Aug. 1967, *Law* 27; Wittenburra Stn., 36 miles S. of Eulo, Jan. 1937, *Everist & Smith* 41; Caiwarro Stn., near Hungerford, Sept. 1885, *Cotter;* Cunnamulla, *Evans* 49 and Feb. 1936, *Latham* 4; Gilruth Plains Stn., near (E. of) Cunnamulla, Sept. 1938, *Everist* 1633. Maranoa District: Boatman Stn., [SSW. of Morven], Mar. 1947, *Everist* 2852; Dingwall Stn., about 95 miles SE. of Charleville, Apr. 1948, *Everist* 3401, 3401A; [W. of Bollon] between Bollon and Shamrock Wells Stn., May 1936, *Everist & White* 30; Bollon, Feb. 1937, *Belson;* near Roma, *Cumming;* Surat, *Shirley;* Glenearn [Stn. about SSW. of] Surat, *Thems in hb. Woolls* NSW 25068; Miltonise Stn., ± 30 miles W. of St. George, 180–200 m, Mar. 1936, *Blake* 10809; St. George, Nov. 1934, *Gillham* 6; Noondoo Stn., SE. of Dirranbandi, 165 m, Feb. 1936, *Blake* 10611; Noondoo Stn., Feb. 1963, *Capper*. Darling Downs District: Dogwood Creek near Gurulmundi, in 1930, *Belson*.

NEW SOUTH WALES.—Far Western Plains: Bulloo (?), *Moore;* Waverley Downs Stn., Apr. 1906, *A. W. Mueller* NSW 25071; between Uriseno and Thurloo Downs Stn., Oct. 1912, *Boorman* NSW 25040; Tarella, Aug. 1887, *Bäuerlen* 96; Mt. Murchison, Dallachy (?); Silverton, Nov. 1884, *Harris;* Broken Hill, Dec. 1892, *Williamson*, and Aug. 1919, *A. Morris* 9; Goginga Mtns [= Scrope Range], Nov. 1860, [*Beckler*]; Darling R., *Dallachy*. Western Plains: Near Cumborah on Walgett to Goodooga Road, Apr. 1963, *Vickery* NSW 63620; Collarenebri to Walgett on western road, Dec. 1934, *Vickery* NSW 25049; Bourke district, May 1900, *Hatten* NSW 9109; Bourke, 105 m, Sept. 1947, *Constable* NSW 7914; Mt. Oxley near Bourke, July 1958, *Ingram* NSW 52371; Tarcoon, Nov. 1903, *Boorman* NSW 25059; Walgett, in 1890, *Musson* 359, 367; Louth, Sept. 1910, *Abrahams* 240; Byrock, Dec. 1934, *Vickery* NSW 25048; Coolabah district, Feb. 1941, *Butchee* NSW 9112; Coolabah, Sept. 1898, *Peacock* NSW 25069, Apr. 1900, *Helms* NSW 25055; 3 miles N. of Cobar, Oct. 1966, *Leigh* W116; Cobar, Sept. 1936, *Carn* NSW 25044, NSW 25060, July 1964, *G. H. Cunningham* NSW 69774, July 1967, *Dumbleton* NSW 96616; 12 miles E. of Cobar, Apr. 1958, *F. H. Brown* NSW 43074; Boppy Mt., July 1903, *Boorman* NSW 25052; West Bogan, Nov. 1934, *Butchee* NSW 25054; Nyngan, Oct. 1883, *Betche* NSW 25065, Mar. 1904, *Maiden & Boorman* NSW 25067, May 1913, *Maiden* NSW 25062, Sept. 1913, *Breakwell* NSW 25051, Oct. 1912, *Blakely* NSW 25066, in 1920, *Little* NSW 25047; Euabalong, May 1906, *Boorman* NSW 25041; Lake Cargellico, July 1951, *Haase* NSW 25046; Condobolin, July 1894, *Kidston* NSW 25073, May 1913, *McDougall* NSW 25063, *Condobolin Exp. Farm* NSW 126551, Oct. 1934, *C. W. Brown* NSW 25045; between Condobolin and West Wyalong, Feb. 1941, *Mort* NSW 25043; Bogan R. [S. of Nyngan], Jan. 1846, *Mitchell* 123; between the Lachlan and Darling Rivers, in 1885, *Bruckner;* Lachlan R. (SSW of Mt. Hope) in 1836, *Mitchell;* Monia Gap, 225 m, Oct. 1947, *Constable* NSW 4602; Cocoparra Nature Reserve, ± 8 miles SW. of Rankins Springs, Sept. 1969, *Willis*, and ± 12 miles SW. of Rankins Springs, Oct. 1969, *Willis;* Griffith, Sept. 1966, *Sainty* NSW 94217. North West Slopes: Liverpool Plains, Feb. 1880, NSW 25050.

The type of *Neurachne mitchelliana* is a small specimen in the Lindley Harbarium at Cambridge written up by Nees. The only locality on the label is " Major Mitchell's Expedition 1836. Interior of New Holland ", but it is likely that the specimen was collected on 18 Apr. 1836 along the north side of the Lachlan River SSW. of Mt. Hope. In his journal for this day Mitchell noted that he had collected several grasses including " *Lappago racemosa* " which I assume to be this *Neurachne*, especially as Nees did not mention *Lappago* or *Tragus* among the grasses collected by Mitchell identified in the paper in which this species was described. Mounted on the same sheet is another specimen of this species collected by Mitchell (no. 123) along the Bogan River on 13 Jan. 1846 when he was where Mudall Station is now, about 20 miles south of Nyngan.

Bailey's figure in Ill. Monogr. Grasses Qd and his locality record in Qd Fl. loc. cit. were based on his specimens from Mount Maria Station, near Morven, which are of *T. xerophila* not *T. mitchelliana.* Gardner, loc. cit., identified *Neurachne multiculmis* Pilger (*T. multiculmis*) with *T. mitchelliana* and Lazarides, loc. cit., included both this and *N. xerophila* (*T. xerophila*) in his account of *Neurachne mitchelliana.*

The spikelets are decidedly variable in size and indumentum. Those in the middle of the inflorescence tend to have the lower glume densely pubescent all over except for the window and the upper glume densely pubescent on the back with long slender hairs mixed with the bristles and loosely pilose on the back; towards the top of the inflorescence the indumentum on the upper glume tends to become longer and the bristles fewer and more slender and hidden by the slender hairs; towards the base the indumentum tends to become restricted to the lower part of the lower glume and to become sparse to absent on the upper glume, in the latter case with more conspicuous though gradually shorter bristles, while the lowermost one or more may be quite glabrous; the window of the lower glume tends to become narrower in the lower spikelets. The teeth of the glumes and lemmas are variable in size but usually evident, the mid-tooth of the lemmas being relatively narrow but the lateral ones are usually short or reduced to shoulders.

Some of the collections from Western Australia and the Northern Territory have a few of the uppermost spikelets longer than usual, up to 8 mm long with the internode between the glumes 1 mm long on *Symon* 2510 (AD, PERTH) from along a domestic drain at Giles. These specimens are from luxuriant plants about 45 cm high with some inflorescences longer than usual, up to 6·5 cm long with a few of the lower spikelets distant by up to 10 mm. At the other extreme, *George* 3780 (PERTH) from Muggan has unusually small spikelets 4·5–5 mm long resembling those of *T. xerophila* in size. A peculiar feature is that the upper glume has very small and few if any tubercles and this appears to be the cause of its more gradually accuminate shape; there are abundant long hairs but few bristles. The inflorescences are still immature and a few have some of the lower spikelets quite rudimentary so that it is possible that the peculiarities are a result of arrested development.

T. mitchelliana is usually found in mulga scrub (*Acacia aneura* and perhaps allied species) but also in Eucalyptus " woodlands " growing in fine-grained red sandy to loamy or also stony soils. It is a drought-resistent very useful fodder grass that responds quickly to rain and is commonly known as " mulga mitchell " or " mulga grass " though " rock tassel grass " has also been reported from one area.

Thyridolepis multiculmis (Pilger) S. T. Blake, comb. nov. Based on *Neurachne multiculmis.*

Neurachne multiculmis Pilger in Diels & Pritzel, Bot. Jahrb. 35: 68 (1904); C. A. Gardner, Fl. W. Aust. 1 (1): 274 (1952), in syn. Type: Western Australia, Irwin District, near Greenough R. along the road to Mullewa, *Diels* 4217 (B, now lost).

Culms in small dense tufts, woolly at the base, ± 15–50 cm high, simple or branched, 2–9-noded, nodes densely or the upper sometimes shortly or sparsely pubescent, lower internodes silky pubescent the upper ones sparsely so in the upper part glabrous below, the topmost (peduncle) long exserted, silky beneath the inflorescence or finally glabrescent. Leaves: sheaths (except the topmost) longer (or the lower much longer) to somewhat shorter than the internodes, pubescent and also ± hirsute with long tubercle-based hairs, the margins densely ciliate (or the overlapped one only in the upper part); orifice bearded; collar densely pubescent; hairs of ligule ± 0·7–0·8 mm long; blades abruptly constricted at base, the upper ones with a pseudopetiole up to 0·4 mm long, 2·5–6 cm long, 2–4 mm wide, pubescent or the lower surface glabrescent, the latter minutely hispid on the sides of the nerves, both sides and margins with some long tubercle-based hairs. Inflorescence tinged violet-black, pubescent as well as setose, linear in outline, much interrupted towards the base with the lower spikelets up to 16 mm apart, 5–9 cm long mostly 5–7 mm wide without the bristles; pedicels 1–2·2 mm long some of them approximated in pairs. Spikelets scarcely acuminate, 5·1–6·8 mm long, 1·6–2·1 mm wide, pubescent, the basal beard with the longer hairs 0·8–1·3 mm long. Glumes slightly unequal, pubescent, the internode between them 0·4–0·7 mm long. Lower glume shorter than the spikelet by up to 1·1 mm, not acuminate, ± elliptic when partly flattened with a relatively broad ± 3-toothed hyaline tip broadly rounded to about truncate in outline, obscurely 2-keeled, intracarinal nerves 5 narrower than the internerves, pubescent nearly throughout, somewhat villous on the sides near the base, margins glabrous except for the ciliolate tip, the transverse ridge well above the middle ± 0·5–1 mm across and ± 0·2–0·4 mm high with 5–10 stout bristles ± 2–2·7 mm long; window somewhat triangular extending beyond the middle; margins at base extending around internode fused to it and not meeting. Upper glume reaching to the tip of the spikelet, acuminate but not conspicuously so above the elliptic-oblong body, the acumen about $\frac{1}{3}$–$\frac{2}{5}$ the total length, obtuse or 3-toothed, 9-nerved with the nerves ± parallel and narrower than the internerves, pilose-pubescent, with ciliate inflexed margins, sparsely pubescent inside with a small densely pubescent area at the tip; lower part indurated, 11-nerved inside, the back finely verrucose and also sparsely coarsely verrucose and with 2–7 submarginal transversely lengthened tubercles on each side with up to 4 bristles each up to 2·7 mm long not meeting in a continuous transverse ridge below the acumen, the back also hirsute. Lower floret male or barren, shorter than the spikelet and upper floret by up to 1·2 mm; lemma verruculose on the back, scabrous-hirtellous or hirsute-pubescent, also with a few tubercles sometimes bearing short bristles, the acumen occupying about $\frac{1}{5}$ the total length, 3-toothed or retuse, scaberulous-ciliate, densely pubescent inside; anthers oblong-linear, ± 2·5 mm long or 0. Upper floret reaching to the top of the spikelet, the beak above the narrowly ovate body occupying about $\frac{1}{3}$–$\frac{1}{4}$ the total length and ± scaberulous; lemma slightly shorter, 3-toothed, lateral teeth short, pubescent inside at tip. Palea longer by less than 0·2 mm, the tip ± free; anthers 0·4–0·75 mm long or ± 2·5 mm long. Grain ± 2·5 mm long ± 1·3 mm wide. Figs. 6A, 10.

WESTERN AUSTRALIA.—Eremean Province: Austin District: Pindar, E. of Mullewa, Sept. 1968, *Ashby* 2578; Barnong Station, May 1952, *Wilcox* M 12; Lake Violet Stn., July 1941, *Bennett* 56; 26 miles E. of Wiluna, Sept. 1958, *Speck* 1369; 18 miles E. of Kalli Stn., July 1958, *Speck* 1060; 14 miles S. of Mt. Magnet on Great Northern Highway, Aug. 1963, *Aplin* 2548; Sandstone, July 1927, *Gardner s.n.;* Blackstone Range, Oct. 1958, *Hampton;* Glenorn Stn., Malcolm, Aug. 1938, *Burbidge* 241, 380.

NORTHERN TERRITORY.—Alice Springs District: Mt. Olga, Sept. 1965, *Everist* 7825; 7 miles WNW. of Ayers Rock, Oct. 1956, *Lazarides* 6150.

The type was apparently seen by Gardner but has since been destroyed. There are certainly some errors in the original description. Inflorescences only 2–3 cm long on plants 50 cm high have not been seen on any species of the genus but the lack of mention of bristles and tubercles, the statement that the upper lemma was hyaline and the lower lemma glabrous, and reference to anthers and stigmas suggest that the inflorescences were very young and possibly on new branches. The type locality is well distant from the known range of other species but quite close to that of *Ashby* 2578. Of the six collections cited by Gardner under *Neurachne mitchelliana* his own from Sandstone belongs to this species and *Meadley* 41 (surely listed here by accident) belongs to *Paraneurachne muelleri* from which Gardner figured *Neurachne clementii*; the others belong to *Thyridachne multiculmis* as understood here.

T. multiculmis was treated as conspecific with *T. mitchelliana* by Gardner, loc. cit. from which it differs in having fewer-noded culms, shorter or obscure pseudopetioles to the lower leaves, longer inflorescences interrupted in the lower part because of the widely spaced lower spikelets, longer pedicels, less abruptly acuminate spikelets with fewer shorter bristles and without conspicuous long fine hairs, the lower glume not at all acuminate with fewer as well as shorter bristles on the ridge, the upper glume only slightly acuminate and the upper floret with a relatively shorter beak definitely pubescent inside and more ovate body, and somewhat larger grain. The window is usually pubescent. Small anthers appear to be associated with cleistogamous flowers.

Thyridolepis xerophila (Domin) S. T. Blake, comb. nov. Based on *Neurachne xerophila*.

Neurachne xerophila Domin, Biblioth. Bot. Heft 85: 284 (1915). Type: Queensland, Great Dividing Range near Jericho, Mar. 1910, *Domin* (PR).

Culms in small dense tufts woolly at the base, mostly erect, mostly 15–30 cm high, 6–12-noded, simple or fasciculately branched or the outer ones often arching and rooting at a few of the lower nodes and there producing tufts of erect culms, all subterete, striate, the lower nodes pubescent the upper especially the topmost ± glabrous, lower internodes densely silky-woolly the upper ones glabrous, the topmost one sometimes ± puberulous close to the inflorescence. Leaves: sheaths mostly shorter to much shorter than the internodes sometimes thrown to one side by the branches, ± pubescent with the overlapping margin ciliolate and with scattered long tubercle-based hairs or the upper sheaths glabrescent; orifice usually bearded; collar puberulous or densely puberulous; hairs of ligule 0·4–0·8 mm long; blades abruptly constricted to a pseudopetiole 0·45–0·7 mm long, flat or the margins ± involute especially upwards, about 1·3–6 cm long and 1·4–4 mm wide, lower surface pubescent or shortly scabrous-pubescent frequently with a few long slender tubercle-based hairs, upper surface ± puberulous at base otherwise glabrous and smooth. Inflorescence setose otherwise ± glabrous, narrowly oblong in outline, often ± attenuate at base, ± 2–3·5 cm long, 5–8 mm wide excluding the bristles, with 7–16 spikelets; axis compressed angular, shortly villous-pubescent; pedicels 0·7–1 mm long. Spikelets acuminate 4–5 mm long, 1·25–1·5 mm wide excluding the bristles, setose but otherwise mostly glabrous or nearly so, sometimes especially the uppermost ones ± pubescent on the back, a few of the lowermost more distant, smaller and with shorter bristles; internode between the glumes 0·4–0·7 mm long. Lower glume shorter than the spikelet by 0·5–0·45 mm, narrowly ovate acuminate with the acumen usually distinctly narrowed upwards, elliptic when flattened out, the keel-nerves 0·4–0·6 mm apart at the base and 0·3–0·35 apart at the tip, the intracarinal nerves stout, wider than the internerves or sometimes one only prominent in the upper part, the tip narrowly rounded to truncate in outline, entire or minutely 3-toothed, minutely scaberulous-ciliolate on the margins in upper part and the nerves there also scaberulous, elsewhere glabrous, sometimes with additional tubercles on the back; transverse ridge about the middle of the glume, about 0·7 mm across with 10–13 or more bristles 1·2–3 mm long; window narrowly ovate-triangular 0·45–0·7 mm wide. Upper glume reaching to the top of the spikelet, narrowly ovate acuminate, tip subtruncate to subtriangular, entire or minutely 3-toothed, the lateral teeth usually distinctly shorter and narrower than the triangular middle one; acumen about $\frac{2}{5}$ the total length of the glume or a little less, narrowly subtriangular, green, prominently nerved, the internerves narrower than the nerves upwards those on each side of the midnerve much wider below, scaberulous otherwise glabrous outside including the margin, or the back ± pubescent, pubescent inside towards the tip, lower part indurated, ± stramineous, fairly prominently nerved, tuberculate with a dense series of transversely widened tubercles almost from the base on 2 outermost pairs of nerves disappearing upwards from the external pair and moving across to meet and fuse into a ridge at the base of the acumen, also irregularly tuberculate or transversely tuberculate-rugose by fusion of tubercles, the submarginal tubercles sometimes partly confluent by their bases ± 0·2–0·3 mm high with 2–several stiff bristles ± 0·8–1·75 mm long, rarely with some slender hairs added, sometimes pubescent on the back but without long hairs. Lower floret male or barren, shorter than the upper glume by 0·6–1·1 mm, equal to the upper floret or shorter than it by up to 0·25 mm, elliptic-ovate beneath the acumen, slightly convex on the back, the acumen occupying $\frac{1}{5}$–$\frac{1}{6}$ the total length. Lemma subtruncate in outline but minutely 3-denticulate with the middle tooth the largest, ± 2-keeled especially in the upper part, scaberulous or somewhat rugulose and ± puberulent or ± pubescent on the back, sometimes pubescent inside the acumen, sides glabrous incurved below ± inflexed towards the tip, 2·7–3·2 mm long; palea $\frac{1}{10}$–$\frac{1}{2}$ as long as the lemma, shortly 2-keeled, acute or lacerate. Upper floret 2·7–3·5 mm long, 0·9–1·35 mm wide, shorter than the upper glume by 0·25–1 mm, pale brown, very finely striolate, scarcely at all shining, not rugulose, biconvex but compressed, ovate-elliptic below the beak which is $\frac{1}{5}$–$\frac{1}{4}$ as long as the floret. Lemma subacute to obtuse in outline, the midvein minutely excurrent or not, the middle or only tooth minute triangular. Palea embraced all along, veins visible keel-like only in the beak, tip emarginate. Flower cleistogamous or chasmogamous; lodicules ± 0·45–0·5 mm long, 0·4–0·45 mm wide; anthers elliptic, 0·25–0·4 mm long. Grain 1·4–1·7 mm long, 1 mm wide. Figs. 6B, 10.

WESTERN AUSTRALIA.—Eremean Province: Austin District: Mt. William Lambert, Gunbarrel Highway, Gibson Desert, July 1963, *George* 5453; 42 miles N. of Warburton Mission, July 1963, *George* 5326; 15 miles W. of Warburton Mission, Aug. 1962, *George* 3963.

NORTHERN TERRITORY.—Alice Springs District: Macdonnell Ranges, Mar. 1953, *Gardner* 11559; Alice Springs, Mar. 1953, *Perry* 3355; 35 miles SW. of Alice Springs, Sept. 1955, *Perry* 5480; James Range, Nov. 1954, *Chippendale* NT.501; 50 miles E. of Docker River Settlement, Oct. 1970, *Dunlop* 1957.

SOUTH AUSTRALIA.—Far North: 47 miles SE. of Emu Clay Pans, Aug. 1956, *Forde* 353.

QUEENSLAND.—Mitchell District: E. of Jericho, ± 375 m, July 1934, *Blake* 6831; ± 5 miles E. of Jericho, Oct. 1940, *Smith & Everist* 984; ± 6 miles E. of Jericho, Oct. 1940, *Smith & Everist* 991; Great Dividing Range near Jericho, Mar. 1910, *Domin*. South Kennedy District: 22° 24′ S., 147° 22′ E., ± 300 m, Apr. 1945, *Blake & Webb* 15692; 1 mile NE. of Cerito Stn., July 1964, *N. Adams* 1100. Leichhardt District: 32 miles E. b N. of Capella, June 1962, *Story & Yapp* 49; 11·2 miles W. of Emerald, Mar. 1962, *Tothill* H.108; Cometville, in 1879, *O'Shanesy* 3082; Sandhurst Park Stn., Fernlees, Sept. 1933, *Garvey* 6 L.T.G. Gregory South District: 45 miles W. of Windorah, ± 150 m, July 1936, *Blake* 12124; Mt. Margaret Stn., near Eromanga, ± 330 m, July 1936, *Blake* 11897. Warrego District: Cowley Stn., 40 miles E. of Quilpie on road to Charleville, June 1959, *Anson* 15; Mt. Brandon Stn., ± 25° 15′ S., 147° 30′ E., ± 630 m, Apr. 1936, *Blake* 11165; Akary Stn., [N. of] Augathella, Dec. 1961, *Cull;* 45 miles N. of Charleville, Apr. 1968, *Vickery* NSW 85497; Charleville, 300 m, Apr. 1936, *Blake* 11060; Morven, 420 m, Mar. 1936, *Blake* 10905; near Morven, Apr. 1941, *White* 11548; Mount Maria Stn. [NE. of Morven], *F. M. Bailey;* Gilruth Plains Stn., [E. of] Cunnamulla, 190 m, Apr. 1963, *McKee* 10367. Maranoa District: Mitchell, 330 m, May 1934, *Blake* 5763; Dingwall Stn., about 95 miles SE. of Charleville, Apr. 1948, *Everist* 3406; Tatala Stn., ± 100 miles S. of Morven, Apr. 1948, *Everist* 3421; 50 miles E. of Cunnamulla, Dec. 1933, *Whitehouse* and Apr. 1952, S.W.Q.S. 1219; Miltonise Stn., ± 30 miles W. of St. George, 180–200 m, Mar. 1936, *Blake* 10808. Darling Downs District: N. of Jackson, May 1953, *Blake* 19142; Palardo, W. of Miles, 390 m, Feb. 1935, *Blake* 7644; Drillham, 330 m, Feb. 1935, *Blake* 7697; Barakula, *J. E. Young;* Chinchilla, Feb. 1931, *Beasley* 72; Myall Park Stn., Glenmorgan, May 1960, *Blake* 21262; Hannaford, Feb. 1938, *White;* Glenoie Stn. near Hannaford, Apr. 1939, *Everist* 1751; Woodlands Stn., 28° 10′ S., 149° 40′ E., Dec. 1960, *McDonald* 18; Lapunyah Stn., 42 miles NW. of Goondiwindi, July 1958, *Johnson* 513A; Kindon Stn., 54 miles NNE. of Goondiwindi, Dec. 1938, *Smith* 560, 609; between Inglewood and Milmerran, Jan. 1934, *White* 9749.

NEW SOUTH WALES.—Western Plains: 5 miles S. of Narrabri, Apr. 1954, *Vickery* NSW 27108. Central Western Slopes: Dubbo, *Cleland;* 9 miles NW. of Scone, Nov. 1959, *Story* 6937.

Although frequently confused with *T. mitchelliana* and sometimes found growing with it, *T. xerophila* can usually be fairly readily distinguished from it by its narrower inflorescence with apparently glabrous spikelets, its smaller and narrower leaves and its habit. Several collectors have noted that the outer culms of a tuft tend to overarch and root at one or more of the nodes and there produce new tufts of culms and many specimens show this character. It further differs as follows:—

(a) Culms glabrous or only slightly pubescent beneath the inflorescence.

(b) Upper or uppermost nodes glabrous or nearly so.

(c) Upper internodes longer than the leaf-sheaths.

(d) Spikelets mostly smaller but the larger ones a little bigger than the smallest ones of *T. mitchelliana*; the average ones of *T. xerophila* are often like the lowermost ones of *T. mitchelliana*.

(e) Bristles shorter.

(f) Lower glume glabrous or nearly so, with the keels of the beak closer together and internerves narrower than the nerves.

(g) Window narrower.

(h) Upper glume with the beak tending to be triangular rather than oblong with the nerves approaching upwards and internerves on each side of the midnerve wider below, commonly glabrous on the back with the upper margins scaberulous, not ciliolate.

(i) Upper floret more ovate with shorter beak and more obtuse tip.

(j) Grain smaller.

In the short bristles, absence of long fine hairs, shape of acumen of the upper glume and shape of the upper floret *T. xerophila* tends to resemble *T. multiculmis* but otherwise differs from it in having much smaller spikelets and in the characters that distinguish it from *T. mitchelliana*. *Chippendale* NT. 501 and *Lazarides* 5282 have a densely pubescent lower glume as in *T. multiculmis*.

Although *T. xerophila* is sometimes found in mulga scrub it has been found more usually in other communities on less finely textured or shallower soils or in stony ground.

References to *Neurachne mitchelliana* by F. M. Bailey refer chiefly to *T. xerophila* (see under *T. mitchelliana*.)

EXCLUDED SPECIES

Neurachne

meneritana (Poir.) R. & S. ..	Isachne mauritiana *Kunth*
montana Gaud.	Panicum nubigenum *Kunth*
peekelii Lauterb.	Sacciolepis indica (*L.*) *Chase* sens. lat.
paradoxa R. Br.	Zygochloa paradoxa (*R.Br.*) *S. T. Blake*
torrida Gaud. ex Kunth	Panicum torridum *Gaud.*

FIG. 1. *Neurachne alopecuroidea.* a, habit; b, culm; c, over-mature inflorescence showing persistent reduced basal spikelets; d, part of leaf flattened out from inside showing ligule; e, part of axis of inflorescence; f, spikelet from front; g, spikelet from back; h, spikelet from side; i, lower glume from inside; j, upper glume from inside; k, florets from the side, the lower at right; l, lower floret from back; m, palea of lower floret; n, upper floret from back; o, upper floret from in front; p, palea flattened out; q, lodicules; r, pistil and stamens; s–v, grain: s, adaxial view; t, abaxial view; u, side view; v, transverse section; w, diagram of spikelet; x, reduced persistent spikelet near base of inflorescence. a, × 1/10; b, c, × 1; d, × 4; q, × 12; remainder (except w) × 6. From *White* 5330, *White* 5233 (s–v) and *Blake* 20767 (a, b).

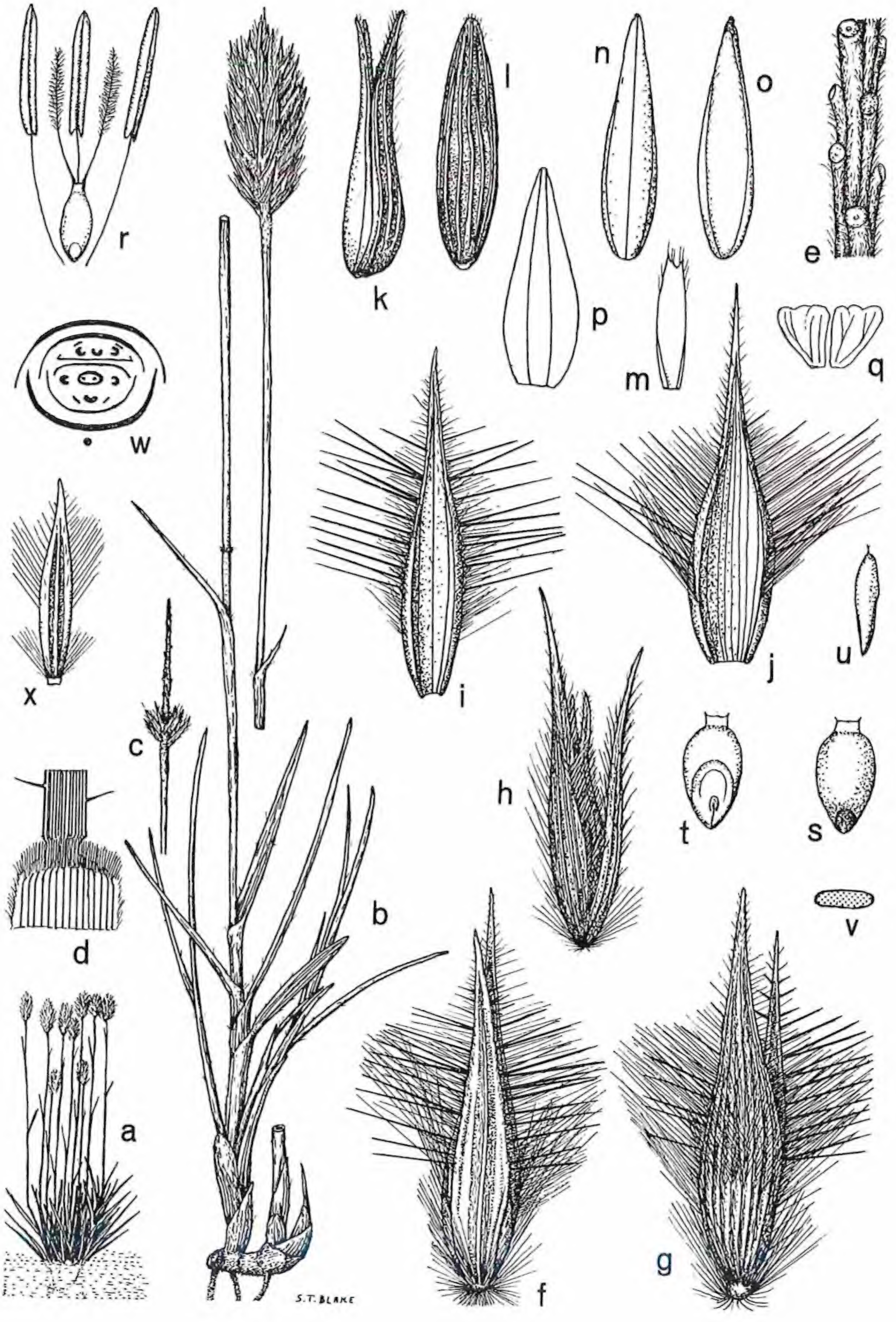
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FIG. 2. *Neurachne* spp. A, *N. lanigera;* B. *N. minor;* C, *N. munroi;* D, *N. queenslandica;* E, *N. tenuifolia.* Parts of types except C from *Blake* 14094. All × $\frac{1}{3}$.

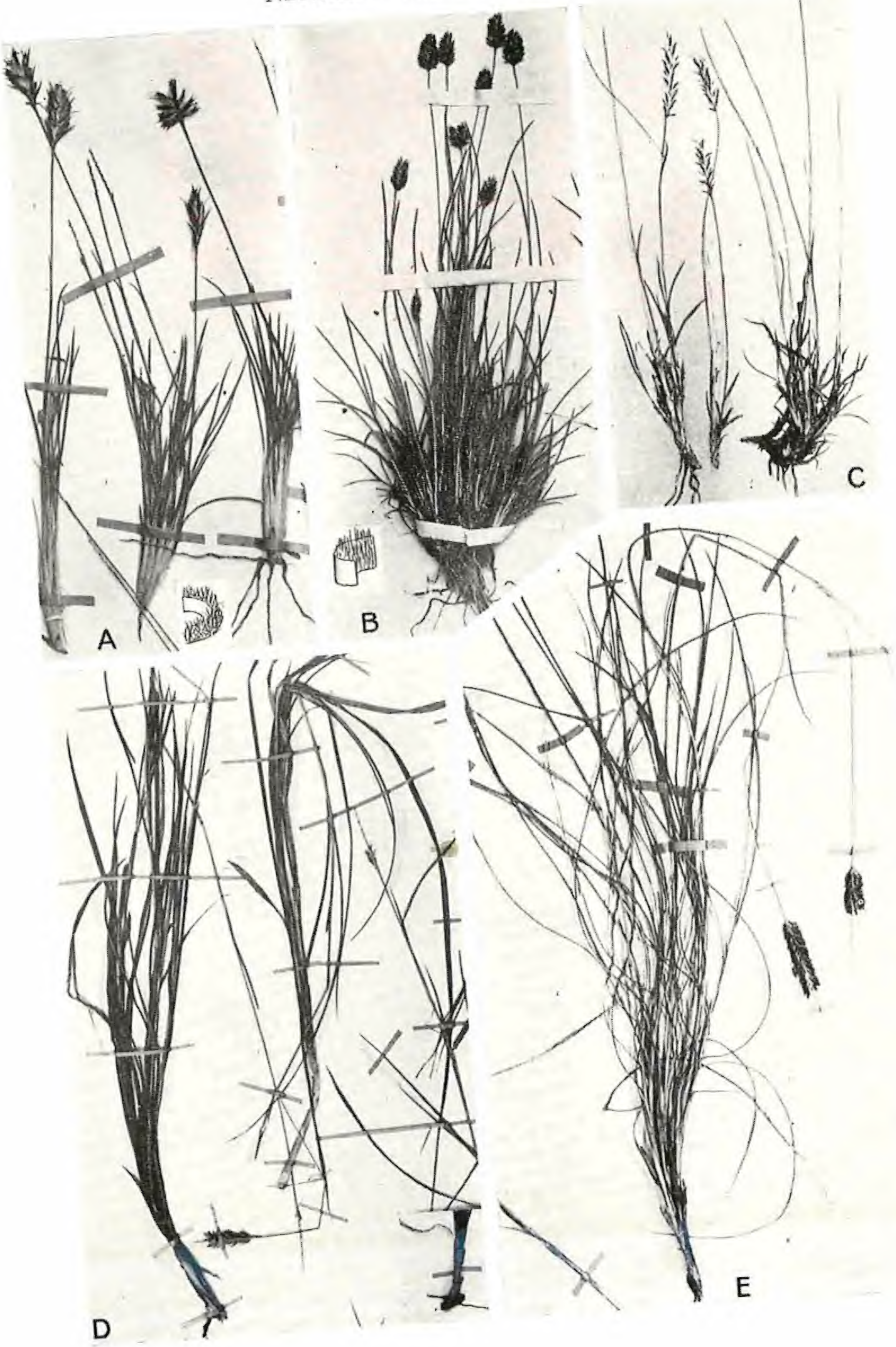
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FIG. 3. *Neurachne* spp. A, *N. langiera;* B, *N. minor;* C, *N. munroi;* D, *N. queenslandica;* E, *N. tenuifolia.* a, part of axis of inflorescence; b, spikelet, front view; c, spikelet, back view; d, upper floret, back view (two shown for C); e, upper floret from in front; f, palea with flower, front view. All × 6. From collections shown in Fig. 2.

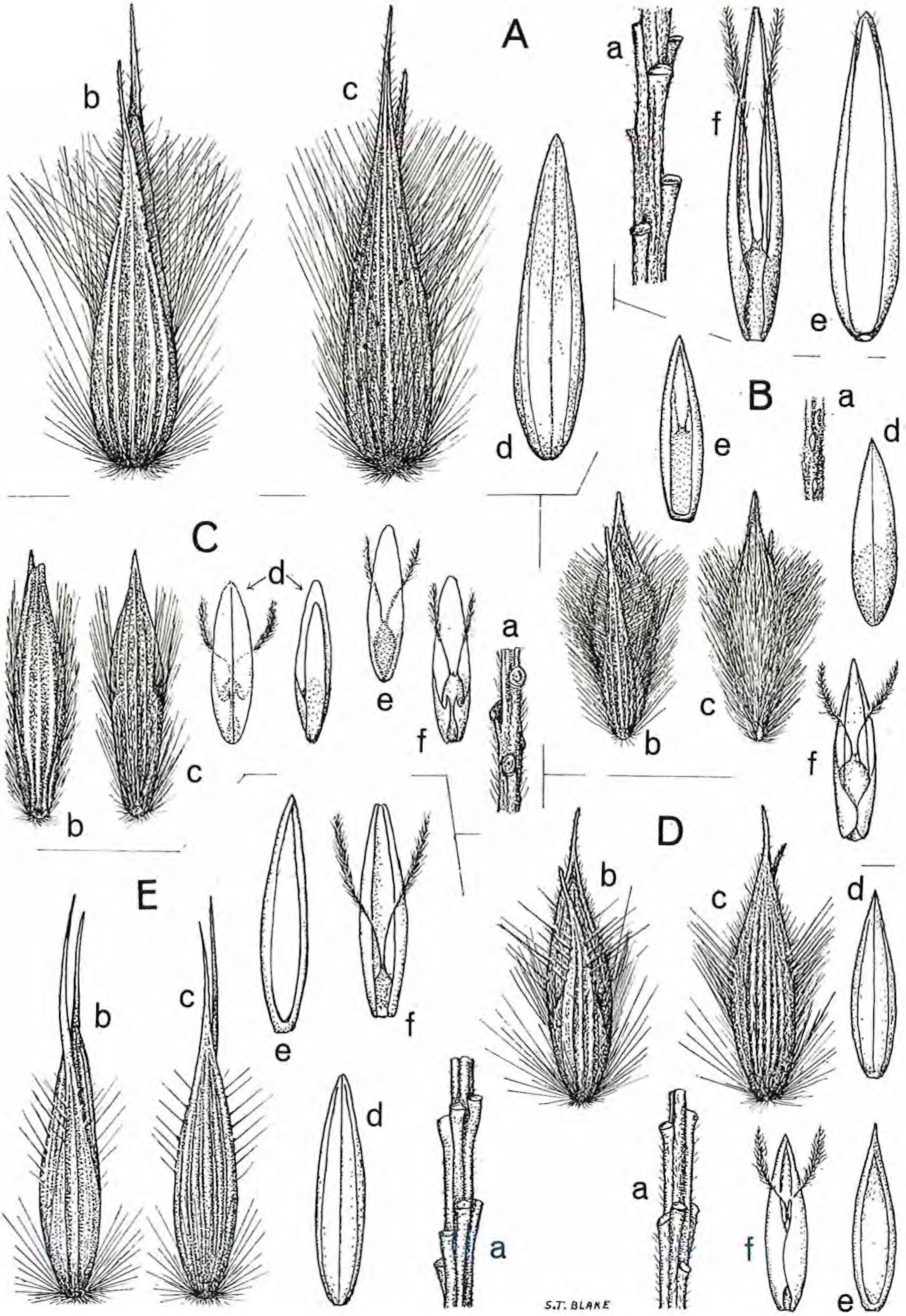
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FIG. 4. *Paraneurachne muelleri.* a, habit, from photograph; b, culm; c, part of leaf flattened out, from inside, showing ligule and base of blade; d, axis of inflorescence; e–g, spikelet: e, from in front; f, from the back; g, from the side, slightly oblique view; h, lower glume, partly opened out, inside view; i, florets, lower to the right; j–l, lower floret: j, floret, back view; k, palea; l, lodicules; m–o, upper floret: m, floret, back view; n, the same front view; o, lodicules; p, stamens and pistil; q, r, grain; s, section of grain; t, diagram of spikelet. a, × 1/10; b, × 1; c, × 4; d–p, × 6; q–s, × 9. a, q–s from *Blake* 11945, remainder from *Blake* 10135.

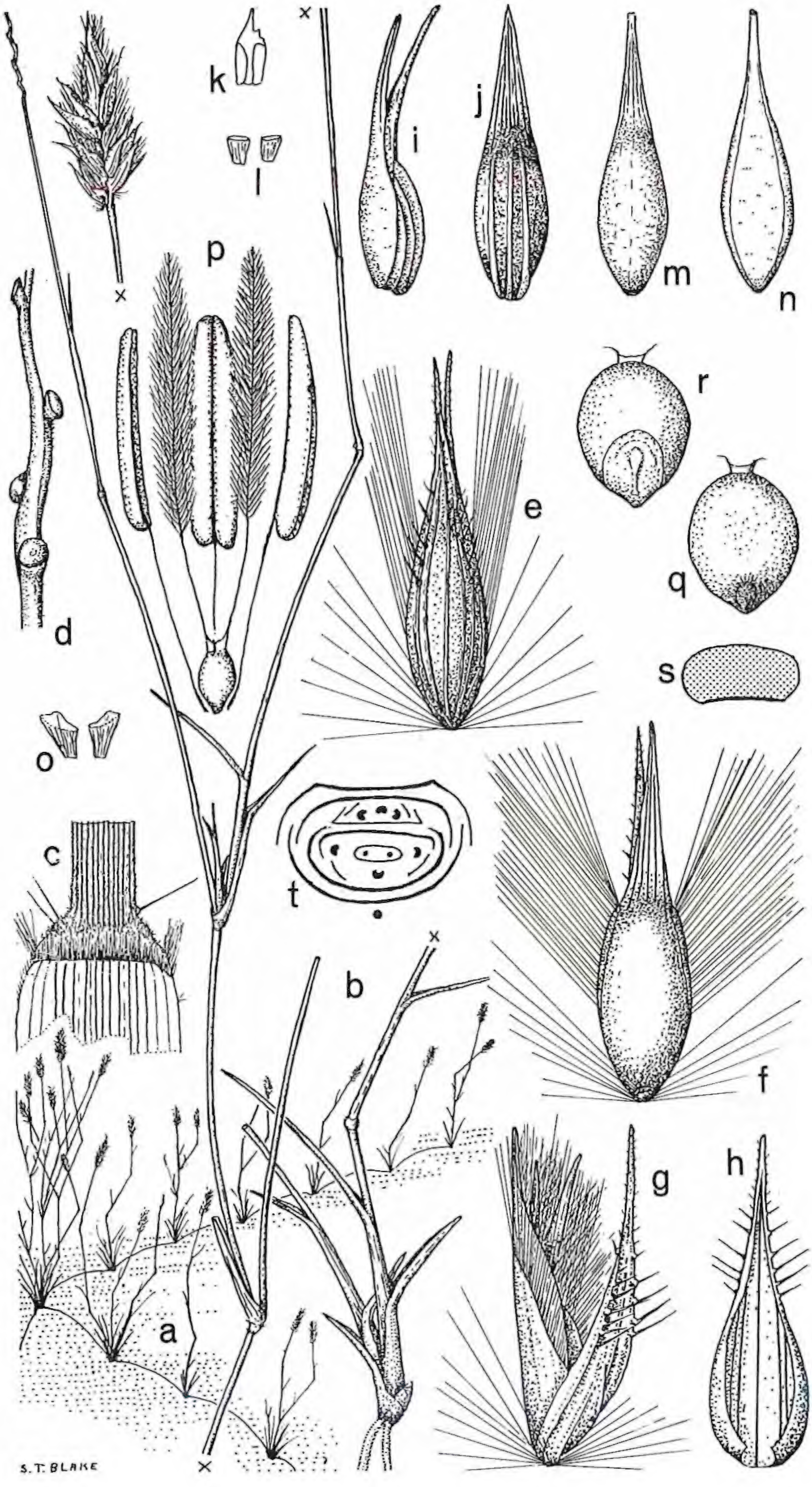
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FIG. 5. *Thyridolepis mitchelliana.* a, habit; b, culm; c, young inflorescence with hairs and bristles appressed; d, over-mature inflorescence with only the lower sub-persistent ± reduced spikelets remaining; e, part of leaf flattened out, from the upper side showing ligule, pseudopetiole and base of blade; f, part of axis of inflorescence; g, h, spikelet from lower part of inflorescence, front view and back view; i, j, k, spikelet from upper part of inflorescence, front view, back view and slightly oblique side view; l, lower glume from inside; m, upper glume from inside; n, florets from the side, the lower at right; o, lower floret from back; p, palea of lower floret; q, upper floret from back, and r, from front; s, lodicules; t, pistil and stamens, u–x, grain: u, adaxial view; v, abaxial view; w, side view; x, transverse section; y, diagram of spikelet. a, × 1/10; b, c, d, × 1; e, × 4; s, t, × 16; remainder × 8. From *Blake* 11061.

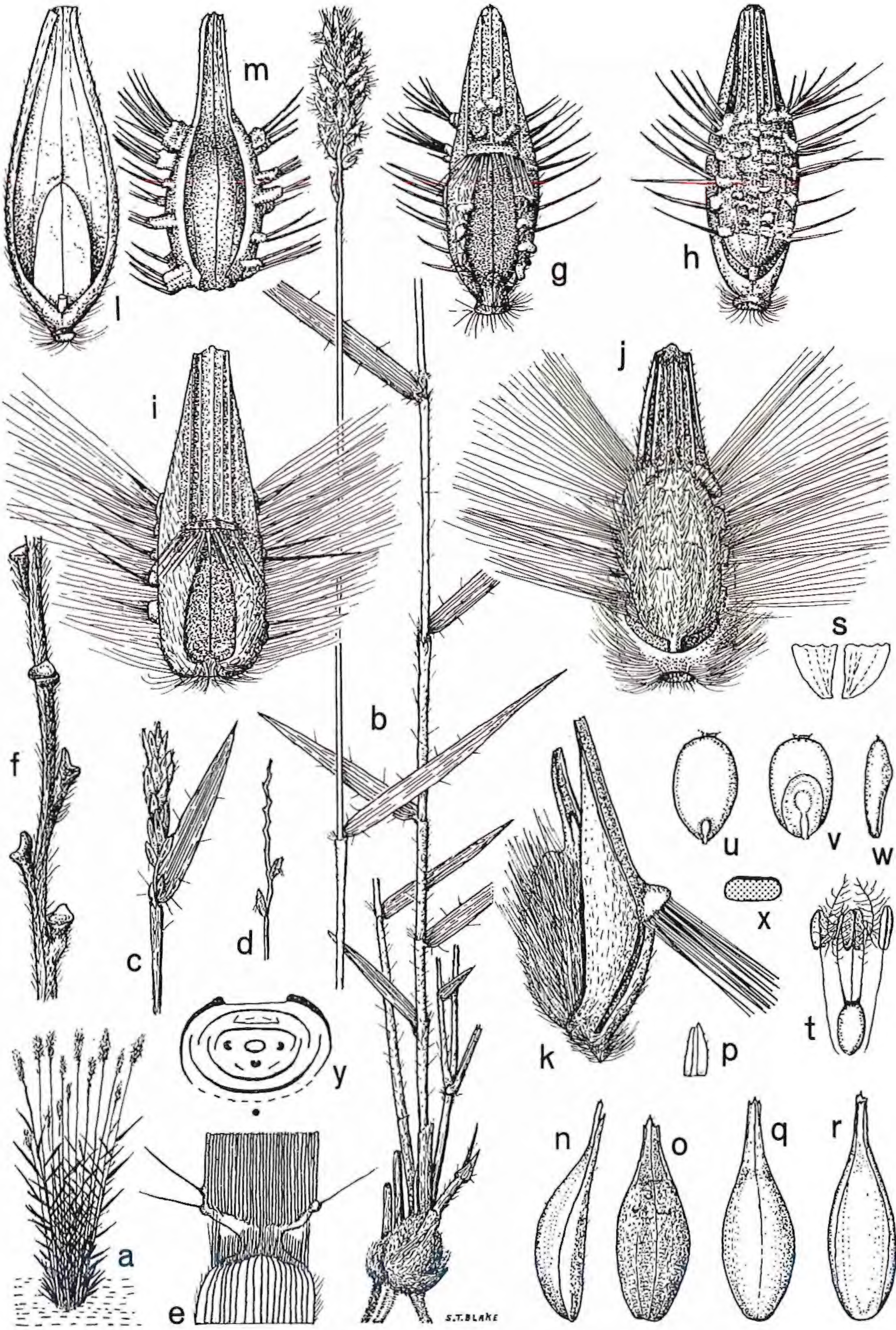
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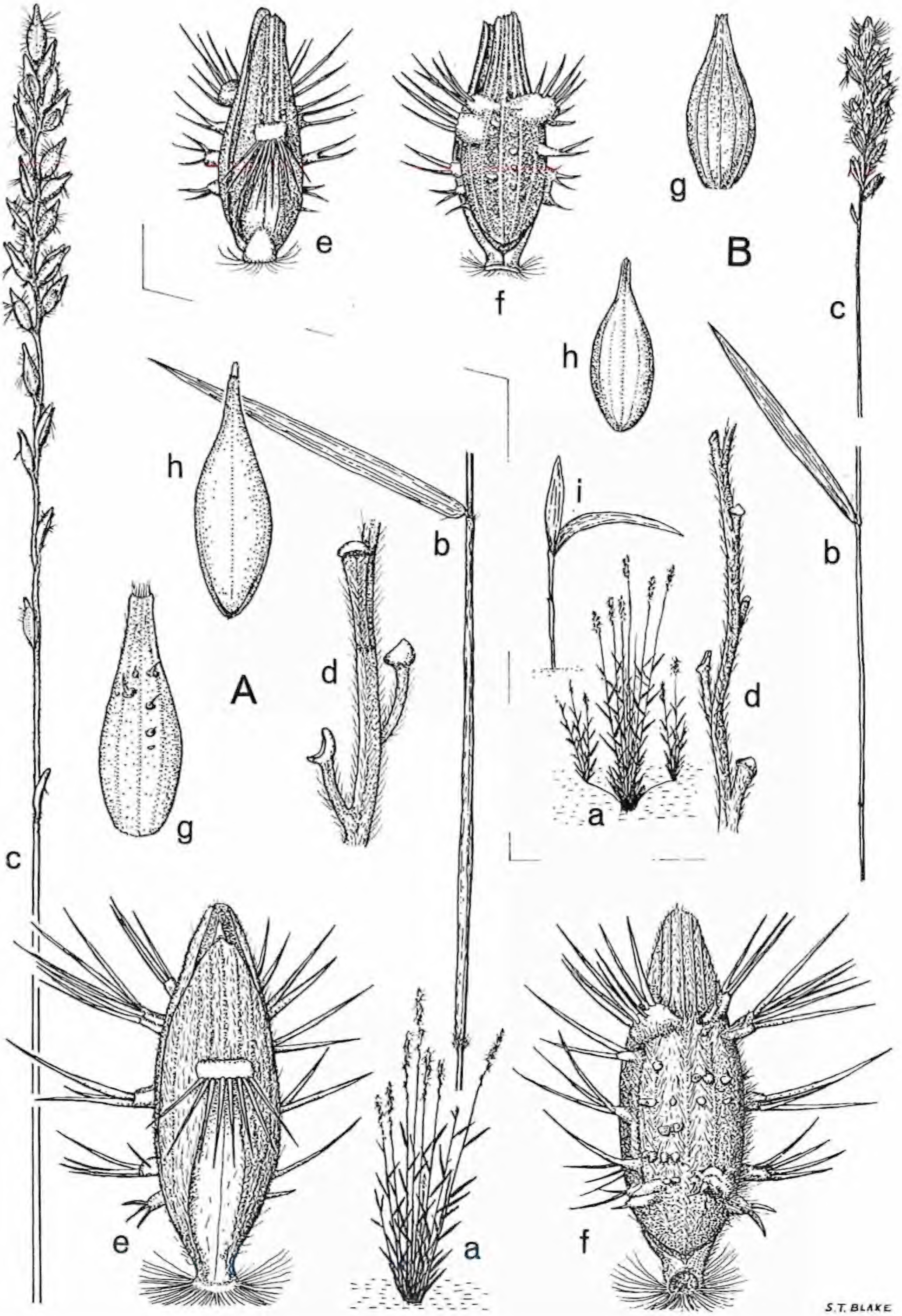
FIG. 6. *Thyridolepis* spp. A, *T. multiculmis* from *Speck* 1369; B, *T.* x*erophila* from *Blake* 11060. a, habit; b, topmost leaf; c, inflorescence and uppermost part of culm below it; d, part of axis of inflorescence; e–h, spikelet from middle part of inflorescence: e, from front; f, from back; g, lower floret, from back; h, upper floret from back; i, seedling. a, × 1/10 approx.; b, c, × 1; d–h, × 8; i, × 2.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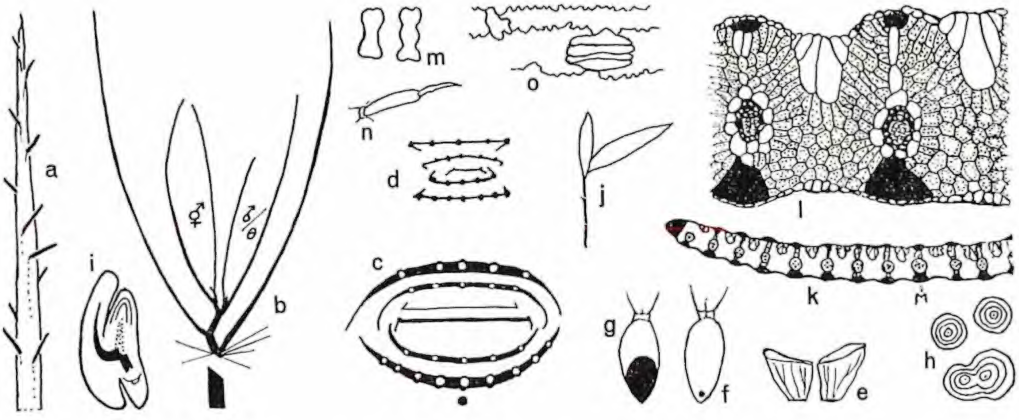

FIG. 7. Tribe Neurachneae. Chief diagnostic characters. Partly diagrammatic and not drawn to scale. a, inflorescence (spikelets omitted); b, spikelet and its pedicel, vertical section; c, d, spikelet, transverse section in lower and upper parts (flowers omitted); e, lodicules; f, g, grain; h, starch grains; i, embryo, median sagittal section (complete vascular system not seen); j, seedling; k, l, leaf, transverse section with midvein at M; m, silica bodies; n, microhair; O, stoma and long cells. k and l after Vickery (1935); m–o from Clifford (unpublished).

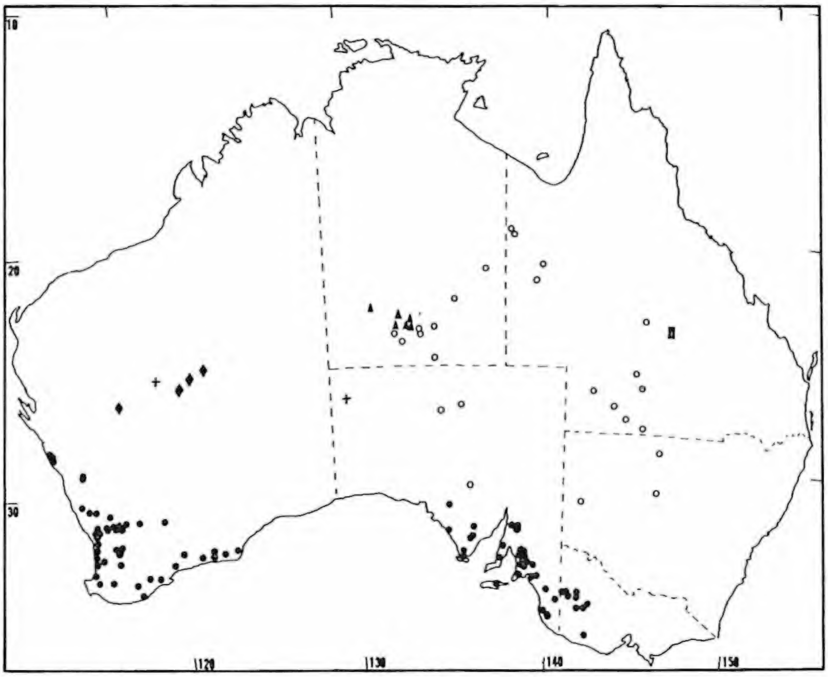

FIG. 8. Distribution of *Neurachne*

● *N. alopecuroidea*
+ *N. lanigera*
◆ *N. minor*
○ *N. munroi*
■ *N. queenslandica*
▲ *N. tenuifolia*

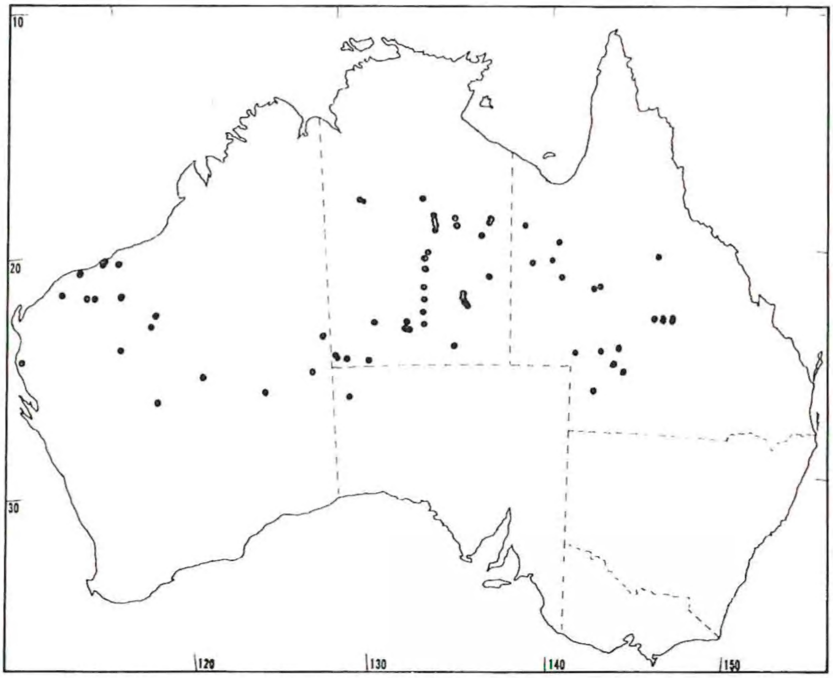

FIG. 9. Distribution of *Paraneurachne*

● *P. muelleri*

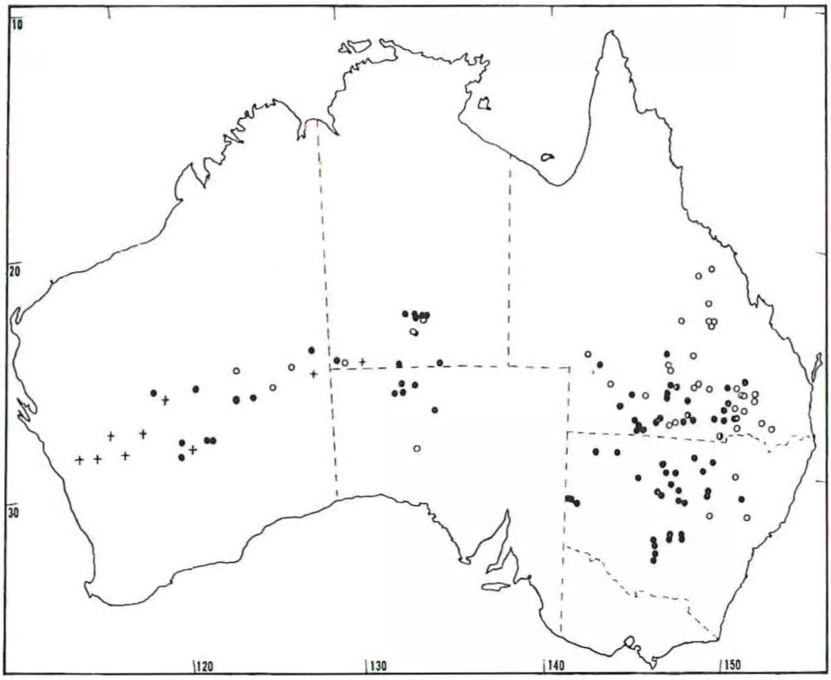

FIG. 10. Distribution of *Thyridolepis*

● *T. mitchelliana* + *T. multiculmis* ○ *T. xerophila*

INDEX TO BOTANICAL NAMES

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CONTRIBUTIONS
FROM THE
QUEENSLAND HERBARIUM

Papers are numbered consecutively, paged independently and issued at irregular intervals. Those previously published are

No. 1. A Revision of *Melaleuca leucadendron* and its Allies (Myrtaceae).
By S. T. Blake. Published 27th May, 1968.

No. 2. *Podolepis monticola,* a New Species of Compositae from Queensland.
By R. J. F. Henderson. Published 9th September, 1969.

No. 3. A Cytological Study of *Lantana montevidensis* (Spreng.) Briq. in Queensland.
By R. J. F. Henderson. Published 9th September, 1969.

No. 4. Notes on *Acacia,* chiefly from Queensland, III.
By L. Pedley. Published 9th September, 1969.

No. 5. Intermediates between *Eucalyptus populnea* F. Muell. and *E. brownii* Maid. & Cambage.
By L. Pedley. Published 9th September, 1969.

No. 6. New Species of and Notes on Queensland Plants. V.
By L. S. Smith. Published 9th September, 1969.

No. 7. A Revision of *Carpobrotus* and *Sarcozona* in Australia, Genera Allied to *Mesembryanthemum* (Aizoaceae).
By S. T. Blake. Published 9th September, 1969.

No. 8. Studies in Cyperaceae.
By S. T. Blake. Published 9th September, 1969.

No. 9. A Revision of *Plectranthus* (Labiatae) in Australasia.
By S. T. Blake. Published 23rd April, 1971.

Distribution of No. 1 began on the 27th May, 1968, the date on the cover and title-page. Nos. 2–8 have "Issued 30th September, 1969" on the cover and title-page but they were received from the printer on 9th September and distribution began on that day. No. 9 was dated 7th May, 1971; it was received and distribution commenced on 23rd April.

Now simultaneously published are

No. 10. *Trachymene cyanantha,* a new Species of Umbelliferae from Queensland.
By D. E. Boyland.

No. 11. A Revision of *Acacia lycopodiifolia* A. Cunn. ex Hook. and its Allies.
By L. Pedley.

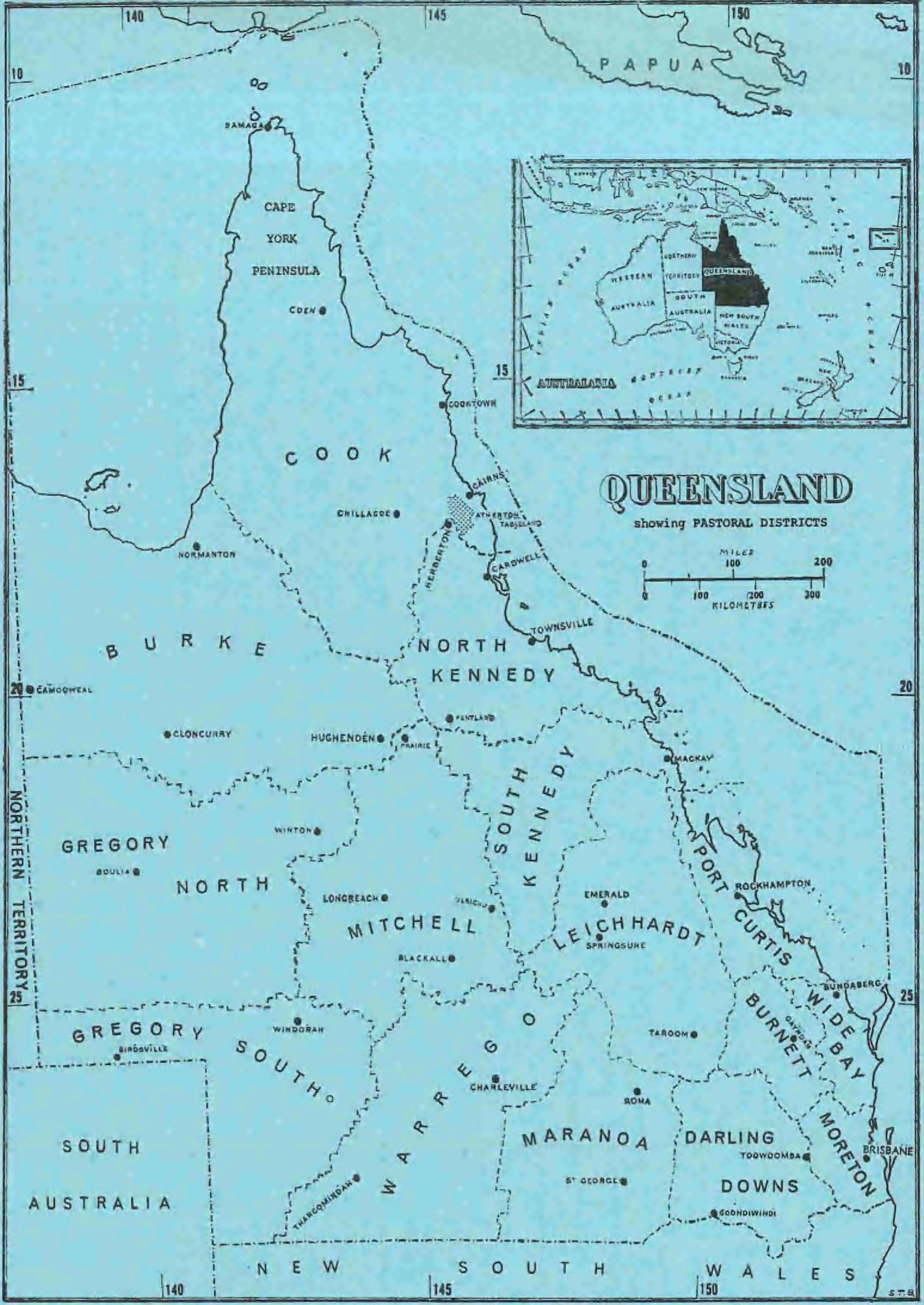
No. 12. *Idiospermum* (Idiospermaceae), a new Genus and Family for *Calycanthus australiensis.*
By S. T. Blake.

No. 13. *Neurachne* and its Allies (Gramineae).
By S. T. Blake.

No. 14. *Plinthanthesis* and *Danthonia* and a Review of the Australian Species of *Leptochloa* (Gramineae).
By S. T. Blake.

Editor: S. T. BLAKE.

S. G. REID, Government Printer, Brisbane



In the citation of specimens from Queensland, the localities are grouped according to the Pastoral Districts shown above. The boundaries of these Districts mostly follow watersheds except for those between North Kennedy District and South Kennedy District and between Gregory North District and Gregory South District.

Compiled from maps issued by the Survey Office, Department of Lands, Brisbane; based on State Map 4a.